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Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world – a historical perspective

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ABSTRACT

Agricultural production in sub-Saharan Africa has, in recent times, remained lower than the rest of the world. Many attribute this to factors inherent to Africa and its people, such as climate, soil quality, slavery and disease. This article traces the role of agriculture through history and argues that these are not the main reasons. Before the arrival of European traders, complex agricultural systems existed, which supported food security, manufacturing and trade. External interference manipulated these systems in pursuit of export crops. Independence has not fundamentally changed this; resource and wealth extraction continue to inhibit economic development for Africans in Africa.

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Introduction

It is widely accepted that agriculture in sub-Saharan Africa (SSA) has been under-performing since independence (Food and Agriculture Organization [FAO], 2009). SSA had modest growth in agricultural production per capita from the early 1960s to the 1970s, and occasional short periods of growth in the mid-1970s and 1980s (Figure 1). However, the overall trend is one of decline, which contrasts with other developing regions. Consequently, food security has been an ongoing problem, with 30% of SSA's population being food insecure (Pfister et al., 2011). Subsistence farming for food security has therefore been a policy focus for many African governments.

Irrigated agriculture in developing countries has significant potential to increase agricultural production, income and food security (De Fraiture & Giordano, 2014; Namara et al., 2014; Wichelns, 2014; Xie et al., 2014). However, due to a history of under-performing, under-utilized and neglected public infrastructure, the World Bank and other donors became reluctant to invest in irrigation in SSA during the 1980s and 1990s (Otsuka & Muraoka, 2017). Since then, there has been a resurgence in irrigation investment and other intensive farming practices (World Bank, 2008). To prevent the failures of the past, we argue that it is important to understand why agricultural production has remained low since independence, and why public-sponsored irrigation schemes

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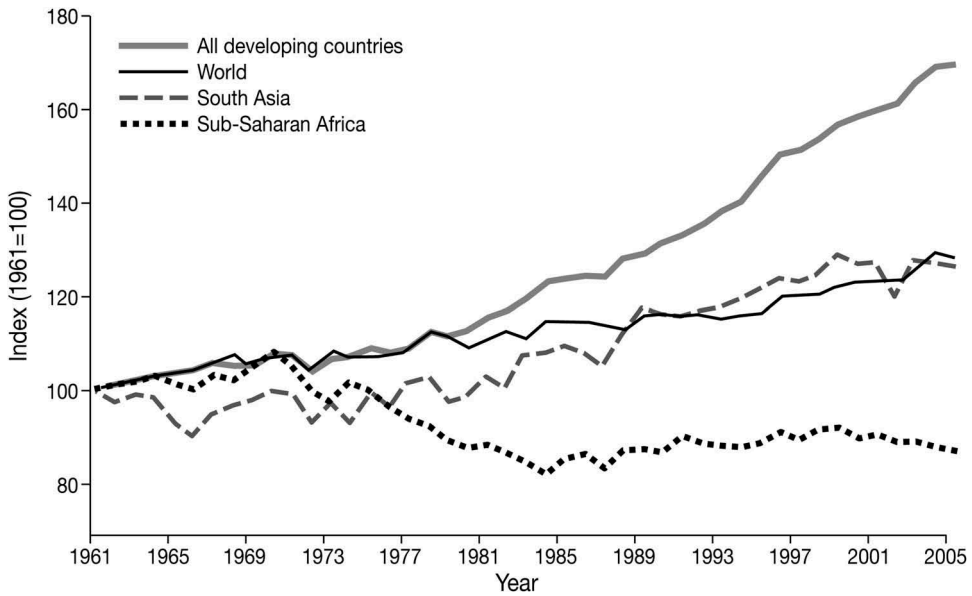


Figure 1. World agricultural production per capita 1961–2005 (index 1961 = 100) (Hazell & Wood, 2008).

have not addressed the problem (which is dealt with in a companion article: Bjornlund et al., 2020).

The overriding focus on growing the economy, rather than economic development, has failed to consider the influence of complex social and economic systems on agricultural production. Consequently, despite sporadic attempts to do so, there has been little sustained and persistent effort to develop commercial farming skills, functional value chains, rural financial institutions and associated infrastructure, which are all essential for farmers to transition from subsistence to commercial farming (Austin, 2004).

As a preamble to this article, it needs to be emphasized that the article does not provide a complete history of agriculture in SSA. It is impossible for one article to cover a region as large and diverse as SSA over a time span of hundreds of years, while paying due respect to all disciplines and nuances. The approach, therefore, is to single-mindedly focus on providing a historical overview that explains the developments across space and time, and to use selected examples to illustrate the root causes of the continued poor performance of agriculture. It is not within the scope of this article to discuss more recent issues such as the role of China, foreign corporate investments in the agricultural sector, or the lease of large tracts of land by foreign nationals.

While many studies focus on factors inherent to Africa and its people (Fuglie & Rada, 2013; McCullough, 2017; OECD & FAO, 2016), this one argues that the root causes of low agricultural productivity in SSA can be traced back to interference by external forces, which focused production on a few export crops. Consequently, the evolution of local economic growth, built on traditional livelihood strategies and adapted to the local socio-ecological environment, was interrupted.

We aim to substantiate this argument by providing an understanding of the major socio-economic and political influences on agricultural production in SSA during four

historical periods. The first section discusses agricultural development before the arrival of European maritime traders, to refute the claim that factors inherent to Africa and its people have caused the poor performance. Discussions of the Royal Charter era and the colonial period, in the second and third sections, illustrate how European interference with the traditional agricultural production systems resulted in a focus on a few export crops. The fourth section discusses post-independence developments and focuses on geopolitical, financial and trade issues which have effectively prevented African nations from introducing policies to increase agricultural productivity.

While SSA is not a single unit and issues vary spatially and temporally, this article discusses common influences across SSA and what this means for agriculture today. In places, West and East Africa are discussed separately, due to their different histories and trading links. The terms 'African farmers' and 'Africans' denote people of an African ethnic origin. The term 'settler' is used to describe people originating mainly from Europe. Places at the colony/national level are consistently referred to by their name today.

Prior to European maritime trade: early fifteenth century

Trade was an integral part of the economy

The African continent had been part of successive economic world systems for more than 4000 years (Fuller, 2003; Mitchell, 2005). The Eurasian transition to a monetary economy from the early first millennium BCE increased the demand in the Mediterranean and Middle East for gold, silver and copper (Dowler & Galvin, 2011). Several trans-Saharan trade routes connected SSA with the Mediterranean and the Middle East (Figure 2). Oases and wetter highlands were used as staging posts, such as in south-east Mauritania and the Fazzan Valley in south-western Libya (Ross, 2011). Navigable waterways (such as the Nile, Niger and Volta Rivers) became part of extensive regional networks, converging on important centres such as Kumasi (the capital of the Ashanti Empire) and Timbuktu (Njoh, 2008). Timber and gold from western Africa were taken north, and salt, horses, dates and camels were transported south. Great wealth was accumulated locally, which supported agricultural development, for example cotton and textile production and other cottage industries supplied the traders (Mattingly, 2017). In the fifteenth century, the societies on the African west coast and its hinterland consisted of hundreds of small political units organized around lineage groups. These societies were very different from those of the manufacturing and trading centres of the interior, such as Kumbi Saleh, Niani, Timbuktu, Djenné, Gao and Kano (Inikori, 2003).

From the first millennium BCE there was trade between the Mediterranean empires and the east coast of Africa via the Red Sea (Chami et al., 2002). This route also integrated economic exchange between the Mediterranean and Burma, Cambodia, Annam, Sumatra, China, Korea and Japan (Fitzpatrick, 2011). The trading stations on the east coast of Africa were either coastal cities or islands and included Sofala, Tete, Kilwa Kisiwani, Zanzibar, Pemba and Mombasa (the Swahili Coast) (Figure 2). By the fifth century BCE, the Arabs had monopolized the east coast trade (Raghavan, 2006). They imported goods such as porcelain and silks from China; textiles, beads and metal objects from India; spices from Java; and glass, tools and iron pots from Iraq, Iran and Arabia. These were exchanged for African goods transported from the interior by local traders using a network of caravan

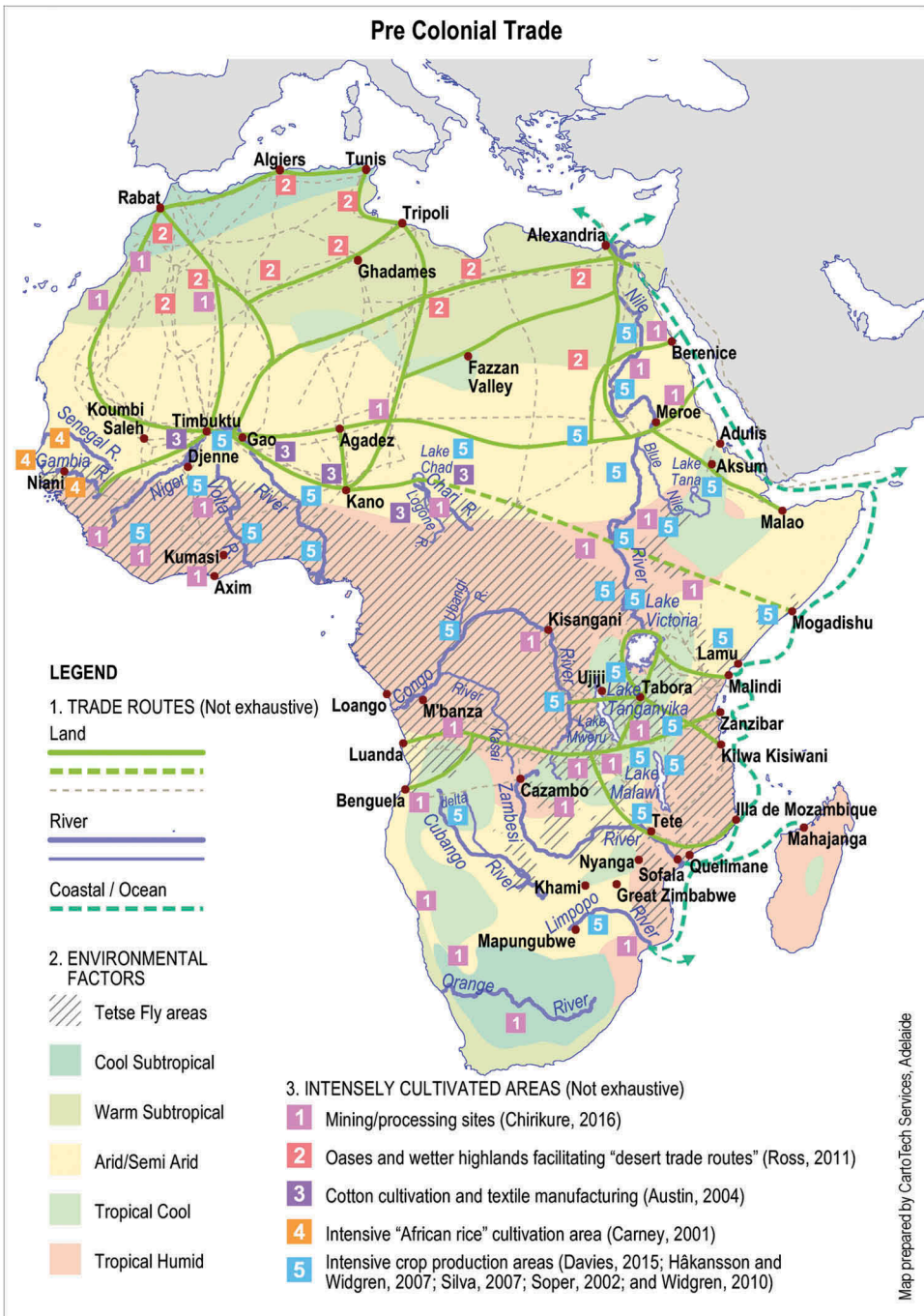


Figure 2. Pre-colonial trade.

routes (Croucher & Wynne-Jones, 2006). These goods included gold from Great Zimbabwe, silver from Zambia and Mozambique, and ivory, rhinoceros horn, animal skins and copper from Zambia. Spices such as cloves and cinnamon were produced in Zanzibar and Pemba, and staple foods and dyes were produced on suitable land near the

trading centres (Croucher, 2015). Labour was also exported. People were brought from inland locations (the Great Lakes district) and sent to India and China as soldiers and labourers (Chang, 1930; D. Davis, 2006; Harris, 1970) or to work on plantations and drainage projects, such as the southern Iraqi marshes, in the first millennium CE (Horton & Middleton, 2000). The coastal cities became wealthy from the taxes imposed on exported goods.

Agricultural systems were adapted to biophysical conditions and demand

Africa is the second-driest inhabited continent. However, within SSA there is either too much or too little rainfall: 25 mm in the south-west, 1500 mm in the north-east, and 2000 mm in tropical West Africa. On the savannah, where annual rainfall variability makes rainfed farming unpredictable and soil fertility and temperature vary greatly, farming systems are based on risk minimization (Seavoy, 1989). To minimize losses due to rainfall variability and pests, farmers used a poly-varietal, inter-cropping cultivation system that produced more than 2000 varieties of grain, including African millets, sorghums and fonio.

Tropical soils are fertile, but they can be quickly exhausted and require 10 or more years of fallowing, which results in ongoing labour-intensive land clearing. A range of edible crops can be grown, but the hot and humid conditions make storage difficult, so crops that can be harvested daily or are easy to store are favoured, such as roots, tubers, legumes, plantains and cereals (Brandt et al., 1997; Ickowitz, 2006). Thus, tropical areas only supported a low population density. Extended family units were self-sufficient for their daily needs and relied on regional gatherings, livestock and cottage industry markets to access other products (Bohannan & Dalton, 1962).

Tsetse flies cause sleeping sickness in cattle, horses and humans. Their presence in forests and parts of the savannah (Figure 2) significantly restricted intensification, as the use of animal power for cultivation and transport, and the availability of manure, were limited (Alsan, 2015; Austen & Headrick, 1983).

Investment in intensification and specialization of production were only possible where fertile land and reliable water sources were present and where surplus production could be traded (Davies, 2015; Pingali et al., 1987). This occurred near lakes and rivers, foothills and highlands, wet coastal regions (Silva, 2007) and inland deltas (Arazi, 2005). These locations could support larger populations capable of producing surpluses to meet the demand from caravan routes and non-agricultural production centres. Communities developed different crop production systems (Harlan, 1982) and invested in intensive agricultural practices such as terraces (Soper, 2002), canals and weirs for irrigated rice production, and keeping cattle in kraals to provide manure for the fields (Davies, 2015; see also Figure 2). Estimates suggest that there were 27 million hectares of crops in SSA in the fifteenth century – with most requiring some water management (IWMI & AWS, 2009) – and a million hectares under irrigation (Goldewijk et al., 2017). The systems developed depended on local biophysical conditions such as rainfall, floods, stream flows and groundwater. For a thorough discussion of the evolution of agricultural water management in SSA see Bjornlund et al. (2020).

Floodplain systems used bunds or small channels to control receding and rising floodwater, such as *fadama/dambo* systems (e.g. in the Niger River and Zambezi River floodplains) or *bas-fond* systems (IWMI & AWS, 2009). Flood diversion systems used short-

term high flows (e.g. spate irrigation from the Horn of Africa to Kenya). Flows could be diverted from seasonal rivers to fields by means of small dams, gabions and channels, or using canals to divert flows for furrow irrigation (in parts of Sudan and in the highlands and foothills of the Great Rift Valley from Ethiopia to Mozambique). Groundwater systems used wells to draw water from shallow aquifers for agriculture (e.g. on the Borotse floodplain in western Zambia – IWMI & AWS, 2009) or for watering cattle (e.g. in western Africa). Between the Senegal and Gambia Rivers on the west coast of Africa, rice-growing was facilitated by dykes, which retained the freshwater and protected crops from salty tidal waters (Carney, 2001; see also Figure 2). In several systems, lifting devices (*shadoofs*) were used to increase the inundated area (Postel, 1999).

Complex cultural traditions existed to support groups during periods of food shortage. Some groups devolved tasks to sub-groups: for example, the mobility of Khoisan herders in south-western Africa was supported by the maintenance of grain storage and water access by sub-groups. Reciprocal lineage responsibilities protected communities when droughts, floods, pests or wars affected their livelihood (Platteau, 1991). Crop selection was also an integral component of food security. A study in Ghana identified three periods of severe drought over the last 1000 years. Two of these periods, 1000–1200 and 1450–1650, had limited impact on food availability because a drought-tolerant pearl millet was grown and harvesting of wild vegetables increased (Logan, 2016).

Key developments in this period

Highly developed and complex socio-economic and political systems existed. They encompassed manufacturing, trade and agricultural systems that were developed, funded and managed by local political entities and therefore accumulated local wealth, fostered further development and provided food security. Where possible, diverse agricultural systems evolved and adapted to local biophysical conditions, with a focus on either food security or intensive agriculture, supporting large populations, manufacturing and trade.

Royal Charter period, early fifteenth to mid-nineteenth century

This period marks a transition from European merchants accessing commodities from west and central West Africa and the east coast of Africa through existing caravan routes, to using European maritime traders. The Europeans were familiar with the trans-Saharan and Indian Ocean trade (Figure 2) and wanted to eliminate the Arab middlemen and avoid the tolls and taxes imposed by the Ottoman Empire (Ball, 1977). The Portuguese arrived first in search of suitable land for growing sugar, and to bypass the trans-Saharan caravan routes (Wolff, 1998). The Portuguese and Spanish developed sugar plantations on the islands of São Tomé, Madeira and the Canaries from the 1420s (Greenfield, 1977). They became increasingly dependent on African slaves (Mitchell, 2005) as part of a 'plantation economy'. This approach was later transferred to sugar, rice and cotton plantations in Brazil, the Caribbean and the southern US (Beckert, 2014; Carney, 2001; Dobie & Saunders, 2006; H. Smith, 2012). These became part of Atlantic mercantilism, which increased the demand for slaves and other commodities from western Africa.

Europeans on the African west coast

European maritime traders arrived on the African west coast in the early fifteenth century, operating under royal charters, such as the British, French, Dutch and Danish West African Companies. The charters gave these companies extensive powers to trade, acquire territory, set up administrations, negotiate treaties with local rulers, and form armies and navies (Micklethwait & Wooldridge, 2003).

Initially, the Africans were part of Atlantic mercantilism, with trade in rice, grain, gold, hides, pepper, cotton cloth, and copper (Barry, 1999). Trading stations were established through treaties with local rulers, with both sides aware of their interdependence and business perceived to be mutually beneficial (Bortolot, 2003; Van Kessel, 2002). Under most treaties, the African rulers ceded use rights to the land where Europeans settled. In return, ground rent was paid, typically a fixed quantity of specified goods (Daaku, 1970). While most treaties granted a long-term trading monopoly to a single European nation, African rulers benefitted from the competition between European traders, such as when the Dutch lowered their prices as English ships arrived (Dapper, 1668), or by changing their alliances and combining forces, for example with the British to fight the Dutch on the Gold Coast in the 1690s (Ratelband, 1953).

As European trade expanded, and trade on the caravan routes declined, new commercial centres, such as Begho in Ghana, and local centres, such as in the upper Niger and Voltas, emerged. Increased trade generated considerable local wealth, which provided an opportunity to invest in other productive activities, such as cottage industries in towns, leading to a division of labour between towns and country (Inikori, 2003; Kea, 1982). By the sixteenth century, developments such as large-scale forest clearance to create farmland had stimulated the emergence of land markets and credit institutions (Austin, 1993; Kea, 1982).

The balance of power shifted to the European traders during the eighteenth century. The demand for slaves increased, as did the trade associated with supplying the ships crossing the Atlantic (Eltis & Jennings, 1988; Da Mota, 1978) and sailing around Africa to Asia. This intensification changed the relationship between the European traders and African rulers. While the early European demand for produce encouraged entrepreneurship, surplus production and trade, the new demand for slaves resulted in social and political conflict (Daaku, 1970; Inikori, 2003; Searing, 1993). Local rulers could not stop the slave raids, and often found themselves in conflict with their neighbours (Hilton, 1985). Population growth slowed. As most of the 12–20 million slaves were able-bodied men, agricultural production also declined, causing widespread famine in many interior communities (Van Dantzig, 1978). During the late seventeenth and eighteenth centuries, slave ships were increasingly provisioned in Europe and the Americas. Demand for West African produce therefore declined, with devastating impacts on production and trade near the ports (Dalrymple-Smith & Frankema, 2017).

Declining profits, lower sugar prices, and increasing export of manufactured goods prompted Britain to prohibit the Atlantic slave transport in the early nineteenth century. This again changed the relationship between Europe and Africa. Africa now became a supplier of commodities to the emerging European industries. The drain of labour ceased and paved the way for the expansion of land-intensive tropical agriculture, mainly cotton, cocoa, peanuts, palm oil for lubricant and candles, karité oil, gum, wax and hides (Agbodeka, 1992; Van Kessel, 2002), engaging smallholders, communal farmers and

estates. For example, Ghana increased its kola nut exports, which were sold within West Africa rather than outside Africa (Austin, 2005). Between 1820 and 1850 palm oil production transitioned from wild to intensive plantation cultivation and accounted for 75% of export revenue (Ministry of Food and Agriculture, 2018). In the 1900s, Ghana became the largest supplier of cocoa (Austin, 2005).

The transition from the production of traditional food and fibre crops to cultivation of export crops exposed communities to the uncertainties of export production, weakened local control over food security and eroded local cottage industries (Frankema et al., 2018). The economic growth experienced by local communities in the sixteenth and early seventeenth centuries stagnated or declined, reinforcing the economic and political domination of the charter companies (Olukoju, 2004). The production systems for export crops often combined traditional features with capitalist elements. In Senegal, French peanut production retained its kinship and family-based farming arrangements, which were cheaper than using hired labour on European plantations. Through the control of commodity prices and trade, the profit from production was transferred to trade (Fall, 2011).

Europeans on the African east coast

In 1488 the Portuguese rounded the Cape, and by 1650 Cape Town and its hinterland had become a strategic Dutch settlement, supplying meat and grain for trade with the East. On the east coast of Africa, the Portuguese encountered a maritime trading system that had operated for millennia and included manufacturing and shipbuilding (Fleisher et al., 2015; see also Figure 2). The local traders were therefore far more experienced with these markets, and the Portuguese had no bargaining power, as they had little to offer. Failing in the marketplace, they resorted to conquest to access the goods (Curtin, 1984). With ships that were better-armed than those of the Arab traders, they used military power to control the shipping lanes (Chaudhuri, 1985). They maintained the Arabs' 'trade licence' system, under which no one could conduct business without buying a permit (Diffie et al., 1977). They set up trading posts along the Indian Ocean, built military installations and took control of strategic points – such as the Cape of Good Hope, Socotra at the entrance of the Red Sea, Bahrain and Hormuz in the Gulf, and Malacca at the entrance to the South China Sea – through which they exercised a monopoly on the textile and spice trade (Newitt, 2005).

When the British East India Company (in alliance with Persia) captured Hormuz in 1622, they ended the licensing system, which freed up trade in the Indian Ocean (Chaudhuri, 1985) and provided access to Calcutta, the cotton-producing centre of India. The Dutch and the French followed, setting up coastal trading enclaves with access to spices and textiles throughout South-East Asia. In the seventeenth century, a third of the goods shipped to Europe from India and South-East Asia were spices, with coffee and tea added later. The availability of labour was the main constraint on production; hence, from 1750 there was a prolific slave trade to cultivate the plantations in the Indian Ocean islands (Allen, 2010; Moore & van Nierop, 2003).

The European traders participated in the existing trading system along the Swahili coast, thereby raising the demand for commodities such as ivory and slaves. By the mid-

nineteenth century some 11,000 elephants had been culled, with more than 500 tons of ivory exported annually from Kenya (Håkansson, 2004; Sheriff, 1987). The reduction in elephants caused an expansion of woody vegetation, constraining the grassland suitable for cattle and promoting the spread of tsetse flies, with long-lasting impacts (Kjekshus, 1977). The caravans across central Tanzania required several hundred thousand porters annually, increasing the demand for food along the routes by 30–50% (Christiansson, 1981). Farmers responded to this economic opportunity by investing in intensive agriculture. Sissons (1984) describes villagers in central Tanzania farming permanent fields, fertilized by manure and protected by thorn-bush fencing. These farmers produced 1,091 tons of surplus food per year, including grain (millet, sorghum and non-traditional high-yielding corn), livestock, dairy products, eggs, vegetables, honey and calabash flour. These crops provided both goods for sale and food security. Intensification through terraces, permanent fields and water management occurred in the highlands and foothills of the Great Rift Valley (Håkansson & Widgren, 2007; Maddox, 1986) and on the floodplains of coastal rivers, from the Tana River in north-east Tanzania to the Limpopo River in South Africa (Tempelhoff, 2008). In the early nineteenth century, rice and spice schemes were constructed along the river valleys around Kipini, Malindi, Shimoni and Vanga in Kenya, and Pangara and Kilwa in Tanzania (FAO, 2015; Ngige, 2004; Nicholls, 1971). In other areas, such as Ugogo in central Tanzania, cultivation expanded onto marginal soils. Although these estimates of trade and their impact on food demand are not precise, they illustrate how farmers responded to the economic opportunities and the impact this had on the environment.

Key developments in this period

At the beginning of this period, the European maritime traders provided new production and trading opportunities, which generated new development and raised living standards. Local wealth was generated and invested in agriculture and cottage industries. With more demand for slaves for the plantations in the Americas and the Indian Ocean islands, European traders started to provision their ships in Europe; thus, economic activity and living standards in Africa declined. The slave trade reduced the labour force in already sparsely populated areas, with devastating impacts on food security and community cohesion. With the end of slave exports, European traders shifted to buying commodities to supply the industrialization of Europe. This process was organized so that limited wealth was accumulated by Africans for investment in Africa. In eastern Africa, this shift did not take full effect until the scramble for Africa and formal colonialization. Hence, Africans continued to benefit from trade in agricultural commodities when opportunities arose.

The colonial period: mid-nineteenth to mid-twentieth century

Africa's transition to the production of export crops was a product of two historical events: the abolition of the slave trade and industrialization in the north Atlantic. Three processes encouraged and facilitated this: a revolution in transportation, reducing travel cost and time (McPhee, 1926); liberalization of import rules for raw materials in Europe; rising gross

domestic product (GDP) in Europe, which increased demand for tropical export crops and other natural resources (Frankema et al., 2018).

A commodity price boom between 1835 and 1885 and the conflict over secure access to the Suez Canal in 1882 (Robinson & Gallagher, 1961) resulted in a rise in the terms of trade for western Africa from the 1790s to the 1880s and led to the European partition of Africa (Hopkins, 1973; Law, 1993). The Berlin Conference of 1884 created colonial territories, with borders that disregarded tribal and ethnic affiliations (Birmingham, 1995; Michalopoulos & Papaioannou, 2017). This separated societies and communities, and disrupted trade routes and functioning systems (Figure 3). The colonial powers thereby secured control over raw materials, markets, and the resulting wealth (Curry-Machado, 2013; Davidson, 1994; Kaya, 2008). This process occurred first in West Africa, and not in East Africa until after 1900, when the production of coffee, tobacco, cotton and tea commenced (Austen, 1987; Klein, 1990; Law, 1993, 2002). While African exports increased through the twentieth century until the 1980s (with some diversification into a range of tropical products and minerals), exports remained commodity based.

The colonial powers focused on two or three export crops in each colony, for example maize and cattle in Zimbabwe, Zambia and Kenya; sisal and coffee in Kenya and Tanzania; and cocoa in the Gold Coast and Nigeria (Gardner, 2012; see also Figure 3). Sisal proved to be one of the most successful crops for settler estates in Kenya and Tanzania. It was easy to grow, resilient on dry and poor soil, and economically viable. Since it required expensive processing, it was suited to large-scale production rather than production by African smallholders (Westcott, 1984). Colonial marketing boards (British, French and Belgian) were established to strengthen the control of export commodities via price controls. African producers were paid below market value, leading to no capital or incentive for investment in agricultural productivity improvements (Rimmer, 1992). This restriction prevented local wealth accumulation in rural and regional centres, hampering the development of the agricultural sector (Havinden & Meredith, 1995; Meredith, 1986). The colonial administrations invested little in infrastructure, such as railways and harbours, and when they did invest it was only to facilitate the transport of raw material (Figure 3) rather than local trade networks and development. Little research or investment went into staple food production and marketing, the assumption being that Africans would continue to grow enough food for themselves (Davis, 1986).

Overall, SSA remained a minor supplier to the north's Atlantic industries, so the colonial powers focused on improvements to facilitate exports and paid less attention to improving local conditions such as health and education. For example, in 1860 Britain sourced 4% of its imports from SSA, which increased to 11% by 1930 (excluding South Africa); France sourced 32% of most of its import commodities from SSA in 1860, decreasing to 19% by 1930 (Frankema et al., 2018). While the volume of exports to Britain continued to increase, the terms of trade in 1940 were below that of 1850 (Figure 4), compounding the divergence in growth rates between Europe and Africa (Deaton & Miller, 1996; Jacks et al., 2011).

While the two major droughts in Ghana before 1650 had little impact on food security, the replacement of local grains by maize and cassava caused chronic shortages during the period of severe droughts in 1890–1920 (Logan, 2016). The introduction of these higher-producing crops saved labour, but with higher risk because they were less

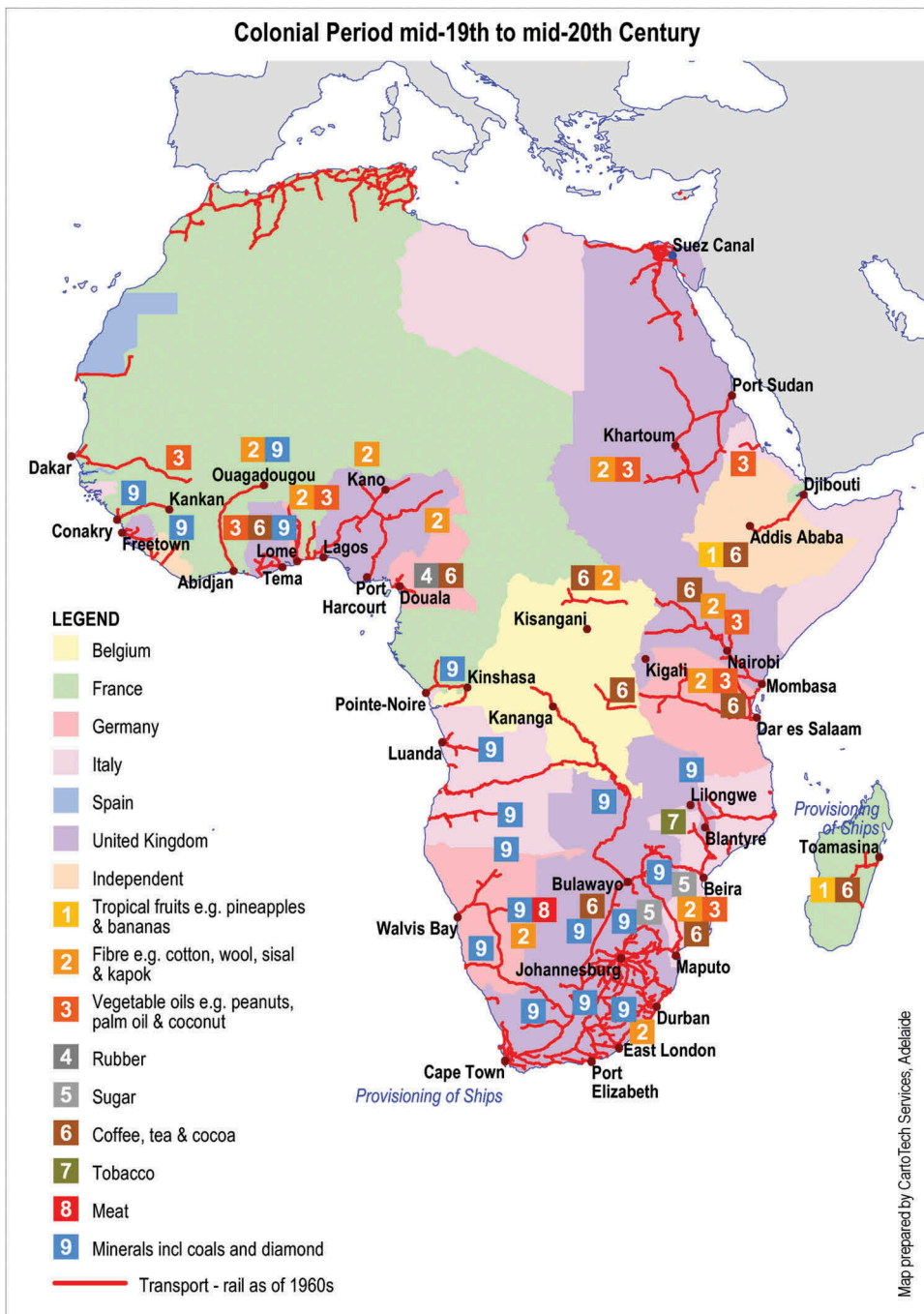


Figure 3. Colonies, export crop production and railroads, mid-nineteenth to mid-twentieth century.

drought-tolerant. The local socio-economic systems were unprepared to deal with this risk, which destabilized regional livelihood strategies and well-being (Austin, 2005; Logan & Cruz, 2014).

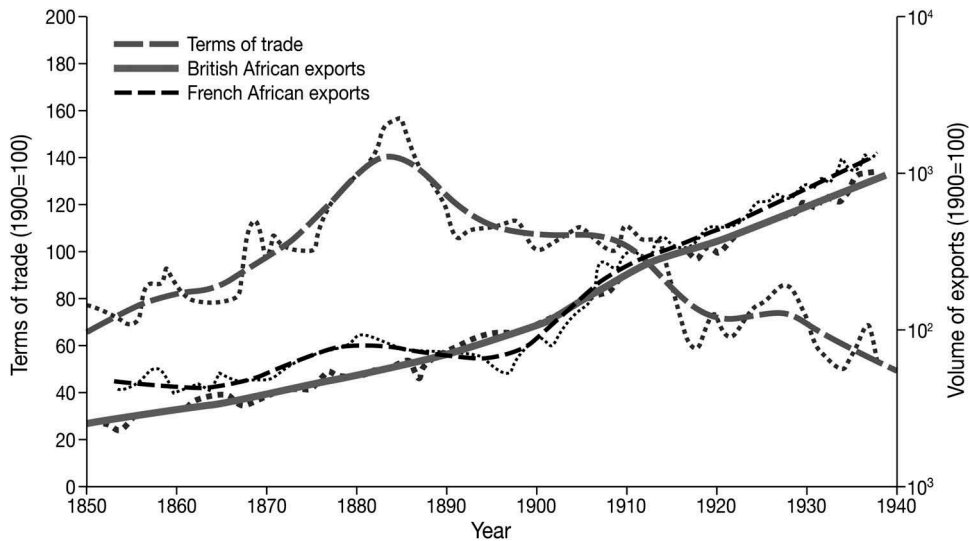


Figure 4. Volume of exports and net barter terms of trade, sub-Saharan Africa, 1850–1940 (1900 = 100) (Frankema et al., 2018).

Land and labour issues

At the beginning of colonial rule, there was an abundance of cultivable land relative to the available labour, and there were opportunities for cottage industries in the dry season (Austin, 2008; Hopkins, 1973). Hence, labour markets were underdeveloped, and local farmers had little incentive to engage in wage labour (Austin, 2008; Binswanger et al., 1995). Colonial governments intervened to secure enough labour for public works and for export crop production through coercive labour laws such as a hut and poll tax, *corvée* labour, conscription, and vagrancy laws (Frankema & van Waijenburg, 2012; Mosley, 1983). Land laws enacted between 1896 and 1918 vested the ownership of all land and resources in the colonial powers (Potts, 2012) while maintaining customary access to land for Africans.

Land alienation increased after the First World War to facilitate the production of sisal, cotton, rubber and oil palm. For example, Firestone received a grant of up to a million acres to grow rubber in Liberia and Kenya, while Brooke Bond and Del Monte received land to produce tea and fruit (Potts, 2012). State-controlled enterprises were established, such as the Office du Niger in 1932, to green the desert in Mali, Chad and Burkina Faso. These developments increased settlement in most eastern and southern African states; for example, there was a nine-fold increase in Nyasaland (Malawi) between 1919 and 1921 (Kanyongolo, 2008). Where land was not deemed suitable for settlement (for example, hot and humid regions with malaria and tsetse flies), settlers used African managers to control plantations of tea, coffee, rubber and palm oil. In either case, the aim was to continue the extraction of minerals and agricultural resources for manufacturing in Europe.

The land and labour issue in West Africa

The agricultural production of export crops in West Africa was already well established at the time of colonialization based on African smallholders, communal farmers and

plantation concessions. The colonial governments neither encouraged a market in land nor changed customary access, as they understood that farms with family labour produced more cheaply than larger farms using hired labour (Binswanger et al., 1995). Land ownership by individual settlers was therefore discouraged or even prohibited, reducing the pressure for land alienation (Amin, 1972; Padmore, 1939). However, foreign companies were given plantation concessions for unoccupied and 'waste' land, which was deliberately vaguely defined to allow companies to acquire concessions where needed (McPhee, 1926).

French settlers were unsuccessful in competing with African farmers. In Côte d'Ivoire, Ghana and Nigeria, the policy of relying on African smallholders to produce export crops paid off, with the real value of foreign trade increasing 20-fold between 1897 and 1960 (Austin, 2008). One of the reasons for this was that African growers used land-extensive methods suitable to the biophysical and socio-economic conditions and cheaper family labour (Hopkins, 1973).

Different resource endowments in forest and savanna areas resulted in different production responses (Tosh, 1980). Forests have fertile soils and well-distributed rainfall and are suitable for crops that are rich in calories and provide high financial returns, for example yam, banana, palm oil, coffee and cocoa. Farmers integrated export crops with subsistence crops by intercropping or double cropping, using family labour or hired labour when profit margins justified it (Austin, 2005). Savannas have brief and erratic rainy seasons. Tsetse prevented the use of draught animals, and there was therefore a strong reliance on labour for grain cultivation for food security. Labour was abundant during the dry season, but scarce during the agricultural season; hence, there could be little labour allocated to cash crop production otherwise food security would be reduced (Fafchamps, 1992).

As the terms of trade declined after 1885, the area cultivated for export crops increased to compensate for the lower returns. With less land available for staple food production and falling prices, many Africans stopped producing export crops to focus on staple food production, sold to alternative markets, or changed their occupation (Isaacman, 1996), which reduced government revenue (Williams, 1985). The use of coercive measures increased (the degree differed between colonies) to either force African farmers to produce or to secure cheap plantation labour (Bryceson, 1990; Wily, 2011).

Chiefs were mainly used to recruit labour for infrastructure projects and plantations, and to ensure that farmers produced export crops, e.g. in Angola, Ghana and Belgian Congo (Fieldhouse, 1978). They were incentivized either by 'carrots' (such as a salary or a percentage of the collected revenue) or by 'sticks' (such as fines and removal from power). In this way, the colonial powers benefitted from the existing social systems of extended lineage obligations (Van Waijenburg, 2016).

Land and labour issues in eastern and southern Africa

In eastern Africa, with large areas suitable for settlement, export crop production did not commence until formal colonialization – until then mainly ivory was exported (Frankema et al., 2018) – which coincided with the end of the Boer Wars and a need to settle retired soldiers (not necessarily farmers). Also, eastern Africa was weakened by a major outbreak of rinderpest in the 1880s, with major loss of cattle and livelihood for

pastoralists (Mack, 1970). There was a need to transfer land to settlers and plantation companies (Frankema et al., 2014). In Kenya, this was made possible in 1902 by all land being vested in the crown. From 1915 land could then be sold to settlers as 999-year freehold leases, disregarding customary systems (Koissaba, 2016; Mortensen, 2004). Some land was reserved for Africans (Potts, 2012), but this was predominantly in areas with poor soils. The White Highlands close to the railway line became an economic core, separated from the undeveloped and unserved African reserves, where landholding was insecure and unprotected from continued settler encroachment (Overton, 1987).

Colonial governments also used land acquisition to force local people into the labour market (Frankema et al., 2014; Kanogo, 1987; Palmer & Parsons, 1977). Though three million ha (30% of all cultivable land) had been appropriated by 1938, only 11% was cultivated (Okoth-Ogendo, 1991). Millions of people and cattle were displaced, with devastating consequences. For example, the Maasai were moved to the Engare Ng'iro swamp, where the population declined by 35% as farmers and their cattle succumbed to sleeping sickness and malaria (Wolff, 1974; Devereux, 2000).

The reserves also functioned to limit African farmers' ability to compete with the settlers (in Kenya and Zimbabwe). Despite this, African farmers accounted for 75% of total exports in 1914. Not until the government prevented African coffee cultivation and pig production within the reserves and introduced protective tariffs did the settlers become the largest exporters (80% in 1921 – Izuakor, 1983; Overton, 1987). These types of policies intensified during the 1920s and 1930s (Overton, 1987).

Government support differed between African and settler farmers. For example, when settlers in Kenya wanted to crossbreed imported bulls with local cows to improve meat production and retain disease resistance, the government-sponsored fencing and immunization but excluded Africans (Overton, 1987). To protect settlers' livestock, the movement of African animals was restricted, preventing access to the best grazing and markets (Fratkin, 2001). Animals were concentrated in the reserves, which caused land degradation. Since livestock trade was central to the pastoral systems, this had a devastating effect. Services such as research stations and certified grading of crops and livestock were provided in settler areas, while the reserves had only one agricultural officer per district. Despite these restrictions, traditional crops (such as sorghums, millets, peas and beans) were replaced by faster-growing varieties, and a few cash crops were introduced, notably sesame, groundnuts, wattle, cotton and vegetables. And the area cultivated by Africans increased considerably because of initiatives introduced by the farming communities (Overton, 1987).

When revenues came under pressure from declining exports during the Great Depression of the 1930s, the colonial government in Kenya reconsidered the restrictions on African smallholders and encouraged them to grow coffee (Frankema et al., 2014). But the settlers protested, and Africans were restricted to 100 trees on less than a quarter acre and only outside the areas where settlers had their plantations. This exclusion prevented Africans from accessing critical services, such as transport, financial institutions and the Coffee Board, and from competing with settlers for labour (Barnes, 1976). Subsequent policies continued to constrain Africans' ability to produce coffee and other high-value crops until the 1950s (Condliffe et al., 2008; Mosley, 1983).

The import of indentured labour, especially from India, played a major role in agricultural development. Indians were originally imported for labour-intensive infrastructure projects; they were considered cheaper, harder-working, and economically more productive than the Africans, who went back home to plant their crops during the rainy season (Bennet, 1963). For example, 32,000 Indians were imported to build the railway from Mombasa to Uganda in 1896 (Phillips, 1989). Many of them were later offered land to produce cotton and sugarcane in Kenya, Uganda and Tanzania (Kapila, 2010).

In Tanzania and Uganda, African producers dominated coffee production, while settlers struggled or failed (Frankema et al., 2014). The colonial government refused to support the settlers because they did not contribute sufficiently to government revenue. By 1929, Uganda had a very healthy peasant economy, and by 1950 it was one of the largest coffee and cotton producers in the Commonwealth. In both Tanzania and Uganda, Asian traders coordinated the market. However, after WWII the British government set up agricultural marketing boards to control the trade of cotton and coffee to stabilize prices. These boards retained most of the profit by paying farmers meagre prices (Eno, 2003)

Development in southern Africa and the African islands differed from western and eastern Africa due to early settlement and a net gain in labour through the reliance on indentured workers. In South Africa, Cape Town was settled by the Dutch in the mid-seventeenth century to provision the ships trading with the East. By 1700, the initial 300–350 settlers had increased to 1300, and the settled territory stretched more than 300 kilometres to the north, forcing the Khoekhoe herders from their land (Mitchell, 2005).

Only in South Africa did African farmers engage in extensive commercial agricultural production. The process began in the 1830s, to supply the European trade at the Cape. This trade reached a peak in the 1870s and 1880s, supplying the large-scale gold and diamond mines. In the 1880s and 1890s, there were substantial African commercial farmers in many parts of South Africa, some owning over 3000 acres, 200 cattle, 40 horses, and ploughs and wagons, and employing many free wage workers (Iliffe, 1983)

The discovery of diamonds (in 1867) and gold (in 1884) united settlers, miners and the British government in wanting complete control of resources (Feinstein, 2005). In 1913, the Native Land Act made it illegal for Africans to purchase or rent land outside the reserves (except for the Cape), but tenants could negotiate conditional access (Crush, 1985). By 1934, South Africa was a self-governing dominion of Britain, with Europeans controlling 62% of the cultivable land. Chronic labour shortages brought indentured Asian workers to the region, for example 152,000 Indians for sugar plantations in Natal between the 1860s and early 1900s and 64,000 Chinese for gold mining in the Transvaal from 1904 to 1906 (Northrup, 1995). In Zimbabwe, the Land Apportionment Act of 1930 similarly facilitated European control of 60% of the cultivable land by creating a zone exclusively for Europeans. With a few exceptions, urban areas became European zones (Northrup, 1995).

Settler farmers in different countries were exposed to the same economic fluctuations, but with differing outcomes. Tobacco farmers in Zimbabwe increased in number (Phimister, 1988), but 55% of tobacco farmers in Malawi were bankrupt by 1945; the rest, sheltered by guaranteed prices until the 1950s, switched to tea production (Palmer, 1985). The African farmers then turned Malawi into the third-largest tobacco exporter (Haviland, 1953, 1954).

Where there were no reserves to act as a buffer, Africans suffered more from land alienation. Angola suffered two waves of Portuguese immigrants seeking land: first 10,000

deported criminals before 1900; then in 1926 even larger waves of settlers, when prewar promises of land in Portugal were not honoured. In Namibia, the end of WWII brought another surge in land alienation, and by 1954 settlers controlled over a third of the country (Werner, 1993).

The African islands in the Indian Ocean came under European control in the eighteenth century, much earlier than continental Africa. Islands such as Cape Verde, Mauritius, Reunion and the Comoros were small but accounted for a large share of African export (mainly sugar) up to the late nineteenth century. Plantations on these islands used indentured labour from India and China.

Lack of industrialization and agricultural development

With a few exceptions, such as sisal, the raw materials extracted in the colonies were used in Europe; local steel and textile cottage industries were discouraged and declined (Thornton, 1991). This had a significant impact on rural communities, as the lack of processing facilities limited the price paid to farmers, removed important crop residues critical for crop-livestock integration, and prevented job creation. For example, in the Gambia, unshelled peanut exports reached 11 million tons by 1851 (Brooks, 1975); after the oil was extracted, the highly nutritious residues were available as cattle feed for European but not African farmers.

While some products were sold in Africa, most products and profit were expatriated (Fieldhouse, 1986). The colonial powers, therefore, had little financial reason to invest in manufacturing in the colonies. Manufacturing would have increased the financial viability of the colonies, but this would have required massive immigration of skilled labour or investment in tertiary education, making the colonies more competitive and self-reliant and increasing the pressure for independence (Msindo, 2018).

Similarly, the colonial powers did not invest in research and development for local crops, the promotion of farm inputs or the development of local markets and institutions. In colonial times limited production or import of inputs (such as fertilizer) took place, so yields stagnated, and many local crops were ignored and forgotten. By 1950, fertilizer consumption in Africa was only 1.5 kg/ha, while in the United States it was 22.3 kg/ha, and in Europe, 46.9 kg/ha (Frederico, 2005).

Infrastructure investment

The rail and port infrastructure did create economic opportunities for African farmers living in the vicinity, thus determining the economic geography of the colony, with long-term effects on development (Jedwab & Moradi, 2012). As with the earlier caravan routes, African farmers responded to the economic opportunity of market access by intensifying their production (Pingali et al., 1987). This is illustrated by the boom in peanut production in Senegal in 1879, when the railroad from Dakar to Saint Louis crossed prime peanut-growing country (Curtin et al., 1978). Similar impacts were seen on peanut production in Nigeria (Yusuf, 2012), maize production in the fertile parts of Kenya and Zambia, and cotton production in Uganda (Pingali et al., 1987; also see Figure 3).

By the late 1920s, road construction also influenced agricultural production in East Africa, such as in Sukumaland in Tanzania, where cotton production spread rapidly along

the new roads. From 1924 to 1940, about 10,000 km² were cleared for farming; 80% of this land was cleared by African farmers migrating into the area. In response to better transport and greater demand from gold miners, by the late 1930s ploughs had been widely adopted to expand the area in cotton, maize and rice (Iliffe, 1979). As rail transportation was far cheaper (Njoh, 2008), road development mainly focused on local feeder roads to bring the produce from the fields or mines to the railway line and, hence, to the ports (Ajayi & Crowder, 1992).

Key developments in this period

The colonial period consolidated agricultural production in each colony in a few export commodities, intervened in emerging property markets, and discouraged cottage industries. Export supplied the growing industries in the North Atlantic at the lowest possible price by using marketing boards to control export, vesting all land in the colonial powers, and applying coercion. This resulted in different agricultural development pathways in western and eastern Africa. In western Africa, most production remained in the hands of African farmers, as they were the most economic producers, but coercion was used in many places to overcome farmers' reluctance due to the low prices. In eastern Africa, settler farmers and plantations were more common. However, without government support and coercion to force Africans to provide cheap labour, they could not compete with African farmers. Many settlers failed, and colonial governments had to rely on African farmers to maintain exports and revenue. These processes locked SSA into producing a few export commodities and prevented the diversification and development of agricultural and marketing systems focused on local development and regional markets. The lack of regional food distribution systems perpetuated the dependence on volatile global commodity markets and continues to threaten local food security. Where it was available, education entrenched Western ideology, governance, science and values.

After independence: mid-twentieth century onwards

Independence took place from the mid-1950s to the mid-1970s. It brought a shift from colonies, linked to the economic and political system of a single European power, to countries, dependent on a global economic system. From 1960 to 1980, the growth of many African economies equalled other regions of the world, with annual GDP growth of 4.8% (Iliffe, 2007; Smits, 2006). Infant and maternal mortality, diseases and malnutrition declined, average lifespan increased, per capita income and GDP continued to rise, and agricultural production increased (Hobsbaum, 1996; World Bank, 2002; see also Figure 1). This was a continuation of the positive economic growth in SSA since the turn of the century (Smits, 2006). Smits asks a pertinent question: 'Why did this early trend not continue?' To answer this question, a global perspective is needed, as well as an understanding of the African rural sector and the policies that prevented its development.

Transfer of power to national governments

African soldiers fighting for the British and French during WWII gained a desire for political freedom. The brutal enforcement of intensified export crop production during the war

(Davidson, 1994) and the establishment of wilderness areas and wildlife preservation on large tracts of land in eastern Africa in the 1950s (e.g. the Serengeti and Ngorongoro National Parks) increased political awareness and grievances (Rangarajan, 2003). The general strike by Nigerian government workers in 1945 almost paralyzed the colonial regime and was one of the largest and most effective independence actions (Hargreaves, 1996). Nationalist movements developed and demanded self-determination. These were led by African elites, educated in the languages and political systems of the colonial powers. The colonial system rejected these movements, but support for independence broadened. The two new superpowers were anti-colonial. The US wanted access to oil and other resources (Roberts, 1986; Smith & Jeppese, 2017), and the Soviet Union opposed colonialism as a product of capitalism (Gilbert & Reynolds, 2004). Further, the United Nations' charter reflected that the international community no longer accepted colonialism (Sithole, 1968).

Three forces, therefore, underpinned independence: the Western world needed cheap raw materials; public opinion was against colonialism; and there was an atmosphere of hope, nationalism, and aspiration for self-determination and a better life. In most of the colonies, especially those with few settlers, the transfer of power was relatively peaceful. But there was violent fighting in the Portuguese colonies, which did not gain independence until after the military coup in Portugal in 1974. And in Zimbabwe, a white minority government took power, and the violent struggle for independence did not end until 1981.

The leaders of independence movements had to transition from opposing a common enemy to building a nation. This required a transition from local leadership (based on cultural/communal affiliation) to national political leadership, which requires very different leadership and administrative skills, which were often lacking. The failure to replace the colonial political structures allowed ethnic and regional leaders to retain power. As many of these leaders had benefitted from the colonial system, they had an economic interest in retaining the status quo, so they facilitated the continued intervention of the colonial powers (Fanon, 1961). The newly independent countries' borders were defined during the 'carving up' of Africa (Figure 3). Thus they lacked the cohesiveness which is essential for creating the allegiances that ensure the longevity of a country (Chatterjee, 1993).

In most parts of Africa, colonialism had left the new countries with no industrialization and disintegrated regional economies. Thus there was a strong focus on economic development to raise living standards and create food security, and to keep the promises made during the independence campaigns. Investment in manufacturing and mechanization of agriculture was a strategy to achieve this, but there was little understanding of or patience for this process, such as the development of skills, transport infrastructure, storage facilities, food-processing and marketing structures, financial institutions, or the skills and innovation needed to use raw materials in local manufacturing (Mendes et al., 2014).

Independent Africa: part of the global economy

The newly independent states were fiscally underdeveloped. Their bureaucracies were understaffed and undereducated and incapable of evidence-based economic policy making (Devarajan, 2013; Frankema, 2013). Their transport systems, developed to extract primary commodities, were inadequate to support active participation in the globalization process (Njoh, 2008), and therefore in need of significant investment. National

savings and export earnings were insufficient to finance the necessary development. In the 1960s and 1970s, the new governments were therefore keen to accept export credits, foreign aid and the concessional loans offered by industrialized countries and institutions. However, most development projects were designed and built to support the donor countries' interest in resource extraction, and the African national governments were responsible for the debt.

The independent states became part of a global economic system dominated by manufacturing and processing industries (Msindo, 2018). By 1950, the US was the world's largest economy, and international markets traded in US dollars, so economic growth in developing countries depended on US trade policies, exchange rates and interest rates. Up to the 1960s, SSA's agricultural products had accounted for more than 30% of global trade, but this gradually declined to 9% by 2000 (Sandri et al., 2007).

Dependence on a single primary commodity and development assistance

In 1966–73, 15 of the 32 countries in SSA depended on a single commodity for 50% or more of their export revenues – for example cotton in Mali, Chad and Benin, coffee in Burundi, and Tobacco in Malawi. SSA's economies were vulnerable to fluctuations in commodity prices, exchange rates, and climate (Addison, Ghoshray and Stamatogiannis, 2016).

Over the past four decades, real prices for agricultural commodities declined by about 2% per year. If since 1980 the prices of the 10 most valuable agricultural export commodities from developing countries had risen in line with inflation, these countries would have made around USD 112 billion more in 2002 – more than twice the amount of aid distributed worldwide during the four previous decades (FAO, 2004).

On the supply side, technological improvements, more competition, less market protection, and currency devaluation contributed to production increases. Synthetic substitutes depressed demand for crops such as sisal, palm oil, rubber and cotton (Page & Hewitt, 2001). As the growth in demand for traditional export crops weakened (Diao et al., 2003), the demand for new products increased, for example in fruit, vegetables, fish, and dairy products (UN, 2002). Under these conditions, large estates fared much better than smallholders, as adapting to the changes required significant investment and infrastructure and benefitted from economies of scale (Gibbon, 2004).

After independence, many governments were encouraged by international donors (see next section) to accept international assistance to modernize and intensify their agricultural systems through irrigation schemes and mechanization (Bolding, 2004). Planners believed that larger production units would support the provision of services such as schools, markets and hospitals and improve rural welfare (Wallace, 1981). However, urban centres have a much larger and more articulate population base and therefore a better ability to influence policy (Sandbrook, 1982). To secure their political support, government policy was more concerned with satisfying the urban demand for cheap food than with supporting rural development and infrastructure (Adam, 1977). Hence, governments often intervened in agricultural commodity markets, for example fixing food prices below market value to secure cheap food for cities (e.g. Nigeria, Ghana and Tanzania), or heavily taxing export crops to increase government revenue. These interventions undermined rather than supported the private sector in commercializing

agriculture (Berry, 1984). In response, farmers either stopped producing these now unprofitable crops, or sold them on the black market, or exported them illegally (Kherallah et al., 2000). Many government responses to the failure to raise production through modernization were to focus their attention on subsistence farming by using government-controlled and government-managed irrigation systems, purchasing equipment, and organizing supplies or by regulating markets (De Wilde, 1967). These policies effectively prevented agricultural intensification from creating economic development and food security, which requires technical changes and secure access to inputs, finance and markets. In the context of small farmers, this requires supply chain integration. All these developments depend on political commitment to poor rural areas, which has proven elusive in SSA (Bjornlund et al., 2017).

Debt crises and rising interest rates

Following the quadrupling of oil prices in 1973, oil-exporting countries needed investment opportunities (Pettis, 2001). As the developed world experienced slow growth, commercial banks came under pressure from heavy-equipment suppliers and construction firms to provide loans to developing countries (Klein, 1990). These factors encouraged irresponsible lending by banks, with no accountability to the people responsible for loan repayments, no attention to local needs, and participation in corruption and nepotism. Entrenched corruption among the political elite increased transaction costs, which was well known to the financial institutions, banks and other donors with the power to contain it (Ayittey, 2005; Henry, 2005; World Bank, 2002). In 1973, the US abandoned the fixed exchange rate (Obstfeld et al., 1985), and from 1976 to 1979 the US dollar depreciated sharply, followed by an even larger appreciation from 1979 to 1985. Combined with an increase in interest rates from 4% in 1960 to 19% in 1981, this resulted in plummeting global demand for resources and a 28% drop in commodity prices for food, fuels, minerals and metals (1981–82). Meanwhile, interest payments increased by 75% in real terms (Grilli & Yang, 1988). In many cases, a given volume of primary produce exported in 1986–87 generated less than half the purchasing power compared to the preceding 35 years (Gersovitz & Paxton, 1990).

Structural Adjustment Policies

The decline in commodity prices in the early 1980s made it impossible for developing countries to service their loans, which had escalated due to the appreciation of the US dollar and the soaring interest rates. Consequently, the International Monetary Fund (IMF) and the World Bank requested structural adjustment policies (SAPs) before recommending further loans. These assumed that the problem was inefficient economic management (Cline, 1995) rather than external constraints that were largely beyond the control of national governments (Haggard, 1984). The factors the SAPs focused on inadvertently reduced productive capacity and market flexibility (critical to a country's economic performance) by reducing consumption, diverting capital to productive activities and attracting international investment and trade (International Monetary Fund, 1989; Payer, 1974; Rao & Storm, 2002).

In Africa, 80% of World Bank adjustment loans were subject to agriculture-related pricing or trade policy conditions (Rao & Storm, 2002), including reduction or removal of

export taxes, quotas, and government controls; reduction of import tariffs and removal of import restrictions; removal of internal market regulations and private-sector restrictions; and reduction in public production and infrastructure services. These conditions drained African countries of capital (Kassaye, 2017).

Structural adjustment significantly reduced a government's ability to invest in programmes to increase production, such as irrigation, research, fertilizer use, seed production and marketing. These were increasingly privatized, resulting in higher production costs and preventing governments from designing agricultural policies to meet domestic needs (Ismi, 2004). The SAPs significantly worsened the economy of Africa (Box 1), which was exacerbated by declining terms of trade, capital flight, brain drain and the devastating effect of HIV/AIDs. The SAPs slowed the initial recognition of the disease, delayed the adoption of drugs, and increased the suffering of AIDS patients (Iliffe, 2007). This had widespread economic effects; for example, several countries had more teachers dying annually from the disease than were graduating.

The IMF approach assumed that countries were uniform. This is inconsistent with economic theory, which argues that it is critical for economic agents to constantly assess their situation and adapt, discard and replace their actions or strategies (Arthur, 1994; Holland et al., 1986; Sargent, 1993). Another problem with the IMF approach is that it is not applicable to economies with structural dualism, such as the mix of subsistence and commercial farming in Africa. In countries where 50–70% of the people are subsistence farmers with limited access to cash (USD 1–2 per day), farmers do not have effective demand and market power. They can at best use their cash as a buffer for food security; they cannot generate overall growth in the agricultural sector (Apata et al., 2011).

International agricultural trade

Intra-African trade remains low. Only 10–12% of Africa's trade is within Africa, compared to 40% and 60% for North America and Western Europe, respectively (Ngepah & Udeagha, 2018). Despite their geographical proximity, African countries trade more with the European Union than with each other. Between 2004 and 2007 only 20% of African food exports stayed in Africa. Reflecting this, 88% of all agricultural imports originate from

Box 1. Impact of structural adjustment policies in Africa.

Slower growth. From 1960 to 1980, SSA's GDP grew by 36%, but from 1980 to 2000 it fell by 15% (Weisbrot, Naiman & Kim, 2000).

Higher poverty. In 2003, over 350 million people, more than half of Africa's population, lived below the poverty line of USD 1 a day, 75% more than in 1994 (Ismi, 2004).

More debt. From 1980 to 2004, Africa's external debt increased by more than 500%, to USD 333 billion. Since 1980, SSA has spent USD 229 billion to service its debt – four times the debt it originally owed. In the past decade alone, Africa repaid the equivalent of three times its debt; yet its debt tripled. Africa, the world's poorest region, pays the richest countries USD 15 billion per year to service its debt (Iyoha, 1999) – more than it receives in aid, new loans, or investment (Ismi, 2004).

Short-term investment projects (such as mining), yielding quick returns but no productivity gains. These were favoured over long-term investments in future productivity, such as infrastructure, research and education (Fosu, 1999).

outside the continent, mainly from the US and Europe (cereals, meat and milk products) and Asia (fruit and vegetables) (Rakotoarisoa et al., 2011). Most of Africa's poor trade performance can be accounted for by poor infrastructure and services (Limão & Venables, 2001), but also a lack of investment in food industries producing goods which are easy to transport. Thus, there is a significant potential to expand inter-SSA trade.

When the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) started in 1986, US agriculture was in its worst crisis since the 1930s. The US therefore insisted on liberalizing international trade and demanded that any new GATT agreement include agriculture (Kjeldsen-Kragh, 2007), cementing the unequal bargaining power of developing countries (FAO, 1999).

In most SSA countries, food consumption and agricultural productivity remained low, hampering employment and food security. The need for food security and equitable development should therefore be reflected in international trade policies. However, there is disagreement about how to achieve this. Some argue that trade in food is consistent with food security, as gains from specialization and trade make food easier to obtain. Others argue that narrow and unstable international markets create fluctuating prices and food insecurity, and that SSA should be protected from this instability by domestic markets. With respect to equitable development, some argue that international trade provides opportunities for developing countries to specialize and secure gains from trade (Amir, 2013). Others argue that free trade provides the wrong signals and weakens a country's capacity for economic diversification and equitable growth (Rao & Storm, 2002).

However, international free trade does not exist. Many policies of the EU and US negate the advantages of African producers. Both use escalating tariffs to protect their own industries and thereby discourage investment in processing in SSA. This transfers value-adding and employment creation from developing to developed countries, with cotton perhaps the clearest example (Dorward & Morrison, 2015). The EU and US also dump subsidized products, such as sugar and milk, at below-production cost in African markets – products which could otherwise be supplied locally or by neighbouring countries (Fowler, 2002). These policies distort agricultural production and trade and confine SSA to the slow-growing sectors of agricultural trade (Watkins, 2003). It has been argued that removing agricultural subsidies and introducing trade barriers could increase rural value-adding in low and middle-income countries by USD 60 billion per year (Beghin et al., 2002), which exceeds most targets for development assistance by 20% (Hertel et al., 1998; OECD, 2001; US Department of Agriculture, 2002).

The US also undermined price-stabilizing commodity agreements negotiated after WWII (e.g. for coffee, cocoa and oil), which sought to secure fair prices for producing and consuming nations and included export restrictions and inventory management. However, the US refused to sign the International Coffee Agreement in 1989, which resulted in price reductions of 30% for products such as coffee (Evans, 1992; Fridell, 2014).

In 2009, China surpassed the US as Africa's largest trading partner, but very little of this trade was in agricultural products. Over the past two decades, China has been the single largest financier of African infrastructure, financing one in five projects and constructing one in three, mainly in transport, shipping and ports (52.8%) but also energy and power (17.6%). Rail links and ports have facilitated the export of raw materials: rehabilitation of roads in Angola, the Abuja Rail Mass Transit System in Nigeria, the rehabilitation of the Lagos-Kano in Nigeria, and a railroad in Mauritania (Chen et al., 2007). Repayment of the

loans is generally guaranteed by natural resources. Trade with China has also brought cheap agricultural equipment and farm-related products to Africa. However, the quality of both the infrastructure and the farm equipment has been questioned. Hence, while China's presence might increase the productivity and profitability of the agricultural sector, it is also associated with financial risks. The verdict on its impact is undetermined.

Discussion and conclusion

Before the arrival of the European maritime traders, diverse agriculture systems were evolving in SSA; they were internally driven and based on local needs and trade opportunities, with surpluses used for further local development. These resilient systems were initially responsive to external influences brought by the Europeans, such as demand for cotton, cocoa and coffee. However, as political, military and economic control concentrated in European hands in the charter company and colonial periods, production focused on a few export crops demanded by European manufacturers. Rather than supporting local development and food security, the economic benefits of production were expatriated. These external forces disrupted the process of system evolution and still hamper agricultural and economic development. Agricultural development is still based on a Western economic and political ideology, rather than African solutions for African conditions. Despite this general trend, there is clear evidence that African farmers have been innovative and ingenious and thus have seized opportunities when they have arisen.

Since independence, the new countries in SSA have had to deal with the colonial legacy. Four main external factors influencing agricultural productivity emerge from this historical discourse: First, internally evolving systems that evolve in the local social, ecological and economic context have changed to externally controlled systems, focussing on the agenda of developed countries and their needs, skills, markets and economies. Second, self-organization, based on local feedback mechanisms, has been blocked by external and central control (e.g. IMF), with devastating impacts. Third, unaccountable borrowing for donor-led investments has often resulted in vast debts for unsuitable and non-productive assets; servicing this debt drains billions of dollars out of SSA each year, preventing investment in human and infrastructure development for local economic growth. Fourth, the reduction in the diversity of commodities, production systems, markets and the feedback mechanisms that maintain them has critically reduced resilience and self-sufficiency and consequently increased dependence on external resources. The challenge is that the focus must move from what the developed world dictates to what Africa needs, which is to develop its people and production base. Africa should not stop exporting, but exports should be tailored to facilitate local and regional development.

How can SSA move out of this cycle? SSA needs to define its own vision, agenda and goals and develop pathways of 'how to get there'. While this is possible, the 'how' is difficult with 'artificial' state boundaries and a focus on Western ideology and culture. Barriers to decision making (e.g. the World Trade Organization's free trade agreements) need to be challenged so local farmers can respond to local demands. Processes should be inward-looking and encourage self- and mutual development, which will require greater regional cooperation as equal partners in trade and technological development.

It is critical that the countries in SSA develop a new vision for how to build research and development (R&D) capacity aligned with their vision and goals. Currently, donor funds are channelled into training and educating young Africans in the developed-world institutions, where they gain significant knowledge and capacity, but it is often irrelevant or impossible to apply in the African cultural, biophysical and economic environment. African scientists often find it frustrating to apply their new skills in their home countries, so they remain in the developed world. There is a need to better align the education and training of local scholars with local needs. The lack of alignment between R&D and the needs of developing countries includes the use of agricultural technologies that are not applicable to SSA conditions (e.g. cost, spare parts, service, use, climate), and thus have low adoption rates. Technologies need to be developed or adapted to meet the needs of the local conditions. Hence, if Western scientists are involved in such development, they must be embedded in SSA, so they thoroughly understand the context in which the science will operate and develop solutions with SSA scientists, farmers and other stakeholders.

For better technologies to achieve their potential influence, many factors need to be addressed, such as governance structures and market integration, and facilitation of a transition from low-producing, unprofitable agriculture to profitable systems (for discussion see Bjornlund & Pittock, 2017, and this special issue). However, it is critical to address the external factors discussed in this article. Most importantly, SSA needs to find ways to reduce its debt, and the World Bank has a responsibility to help. SSA's wealth is spent paying back loans for projects that treat the symptoms of poverty, food insecurity and poor governance, rather than addressing the fundamental development issues, including the legacy of many unproductive assets. This is what keeps SSA poor.

While the importance of externally imposed problems must be acknowledged and addressed, it is equally important to accept that the driving force of the solutions must come from within. SSA must break free from the grip of the developed world, a grip which is deeply entrenched and manifests in subtle ways. Minimizing external control and fostering the organic growth of locally relevant institutions and processes will allow local systems to re-emerge based on local and regional needs and demands. There is a dire need to focus on local and regional development and trade, while still benefiting from large international markets and their associated economies. Profit from export activities can then be invested in SSA and its people, in local transformation and development of agriculture and industry, and in supporting infrastructure, education, and the health and well-being of its people.

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