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WIDER Working Paper 2020/128

Influence of institutional factors on the performance of the agricultural sector in Mozambique

João Z. Carrilho and Rui N. Ribeiro*

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Abstract: This paper is a review of the institutions and the performance of the agricultural sector in Mozambique, using an analysis table adapted to the assessment of the connections between the institutions and economic development. In the first part, information is presented on the performance of the sector between 2008 and 2017, showing a per capita reduction in productivity and the production of foodstuffs. The second part offers an analysis on the extent to which, and the way that, the development of the sector institutions influenced agricultural performance during that period. There was found to have been institutional instability that affected performance in the sector, which was unable to slow the reduction in production and productivity, which could reflect a wider socioeconomic and institutional environment, i.e. beyond the agricultural sector. The third part looks at some elements for reflection on institutional issues that could contribute to the debate on the future development of the agricultural sector. We refer to the need to think about the future of agriculture in Mozambique from a long-term perspective, focusing on the adoption and stabilization of an institutional framework aimed at increasing agricultural productivity and preserving the environment.

Key words: agriculture, environment, institutions, agricultural policy, productivity

JEL classification: Q01, Q15, Q16, Q18

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Tables and figures are at the end of the paper.

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1 Introduction

The analysis of the governance of the agricultural sector in Mozambique uses an institutional diagnostic tool developed through the Economic Development and Institutions research project by the Development Economics Research Group (DERG) at the Department of Economics in the University of Copenhagen. This tool initially covers the criteria of ‘(i) rule of law and judicial independence; (ii) voice, participation and political accountability; (iii) political instability, violence and state legitimacy; (iv) state capacity and autonomy from private interests; and (v) sovereignty and independence’ (Oxford Policy Management 2019: 1).

The five criteria are difficult to separate. We approach them through two closely related factors, which we believe to be that ones that had the most influence in the last 10 years: the performance of the agricultural sector in its prime function of producing food and other goods, and in contributing to food safety (FAO-Netherlands 1999: 1).

The first was the political, economic, social and, sometimes, military context. It refers to sovereignty and independence, political instability, violence, and the legitimacy of the state. The impact of the development of supra-sectoral institutions in the agricultural sector is not an issue discussed in this paper. It is only dealt with supplementarily. We wish only to highlight the fact that the weakness of government¹ and civil and public organizations in general, the fluid rules of the game in a state under construction, with ups and downs,² while not of exclusive interest to the agricultural sector, has a long-lasting impact on it.

This weakness has shown itself in the instability and lack of definition of the role and the responsibilities of public institutions. Action or intervention by institutions was, and still is, influenced by overlaps and, sometimes, incompatibility between the formal and the informal, between Memory and History (Borges-Coelho 2013: 16), between official and unofficial positions, between the actual positions themselves. The work of the agricultural sector has been influenced too by the favour shown by economic interests (Bruna 2017: 32) linked to social groups that advocate accountability and have an interest in sovereignty. Indications show that this favouritism is shown by public agents, possibly under protection. Through these, bridges are built between the central state and written law, on the one hand and, on the other, the authorities and customary local and global rules, not always written or democratic, between the ‘nation’ and nations (Weimer and Carrilho 2017: 15, 208–209; Cahen 2019; Macamo 1996). The need for these bridges is also reflected in the weakness of civil institutions as advocacy organizations for public anxieties, a role that goes beyond their action as pressure groups. Applying Ostrom's institutional analysis and development framework (IAD) (2005: 15), enlarged upon by Whaley (2018: 141, 152), and seeking the relationship between the context, the area of action and the interactions between participants aiming at a goal, we have observed that it is a question of taking advantage of the foundational elements of society and its relationships, both in the domestic and the international area, in a logic of developing public natural resources on behalf of private interests in order to hold on to power.

The second factor having more influence on the performance of the agricultural sector was the poor ability to provide basic services to small farmers in the ‘family sector’ in a way that is

¹ We intentionally avoid the controversial, politically-charged notions of fragile states and failed states. On this subject, see Nay (2013: 2).

² The causes can only be the subject of unconfirmed suppositions.

foreseeable and aimed at the ‘customer’. Taking this to be one of the most important effects of the institutional instability the sector has been subject to, this was the focus of our attention.

2 Overview

As already noted by Mosca and Nova (2019: 24–25), the performance of the agricultural sector in Mozambique is diverse, depending on how the commercial or subsistence sector is assessed. The first, the commercial sector, is characterized by growth in capital-intensive investment, production, and productivity. Private investment is mainly foreign, aimed at export crops and supplying large urban consumer centres. The second, the small farmers sector, is responsible for 99 per cent of the cultivated area and 95 per cent of food production. It includes two-thirds of the country's working population, who have limited job opportunities outside of agriculture. The per capita production, average area of operation and productivity are factors that are in decline. The family agriculture system is maintained through the increase in the number of farms, increasingly smaller, which accompanies demographic dynamics at the cost of systematic deforestation, without increasing the total area, with low use of technologies to increase productivity, vulnerability to weather variations and an annual loss of forests estimated at 3 to 4 per cent of the cultivated area annually. Levels of food insecurity remain stable and high, representing an increase in the number of vulnerable people.

Despite its weight in food production and land use, the family sector is only partially integrated into the market. The state refrained from creating the conditions necessary for empowering greater resilience to the different climate changes and market imperfections. However, this restraint was not seen in relation to large and medium-sized rural enterprises linked to the private interests of the central, local, and international political and economic elite. The public institutions in the sector delegated the responsibility for direct liaison with small farmers to companies, NGOs, and projects. Thus, by design, the public service is no longer autonomous and wide-reaching and has not released itself from the influence of private, domestic, or foreign interests. As only to be expected, alliances and agreements made the parties mutually relevant and responsible for the survival of each one. How can this attitude be interpreted? We can only find indications in our memories of that moment.

We selected two hypotheses that seemed to us to be the most plausible. The first hypothesis is that agriculture was no longer a priority, contrary to that stated in the country's Constitution, no longer correctly receiving the resources that would have been expected.³ It is possible that the attention of the state was absorbed by the imminent challenges to power, under pressure and with systematic questioning of its legitimacy after each electoral cycle, with the consequent political, social and, sometimes, military instability (Correia da Silva 2014). These challenges came in many forms: a generalized war; emergency programmes for dealing with the consequences of the war and natural disasters; the opportunity to invest in the exploration of mineral resources. This was added to by civil society organizations being too weak to influence policies.

The second hypothesis is that the urgency in seeing results in the satisfaction of the rural population has led to attempts to improve governance in the sector. It is possible that these

³ Budget allocations are also dependent on the sector demonstrating its ability to use all of the allocated budget suitably, in terms of the priorities and needs of the production sector. In the case of public agricultural institutions, this ability has been contested due to successive budgetary implementations lower than the annual allocation and the low impact of public expenditure on the increase of agricultural production and productivity.

attempts, seen in the restructuring of ministerial organizations and their policies, very often lacking in continuity, at each electoral cycle, are a response to unsatisfactory performance and the need to manage internal conflicts between elite groups.

Whether through the loss of priority or the ineffectiveness of the institutional changes, according to the 2015 yearbook, which shows the results of the integrated agricultural surveys (MASA 2016: 10), ‘comparing the economic conditions in 2015 with 3 years ago, 20.9 per cent of the farms said there had been an improvement, 32.3 per cent believed economic conditions were neither better nor worse, and 46.8 per cent said that they were worse’.

This overview comes from different sources. As we said, several factors influence ability, peace, safety and foreseeability when making decisions, and the activity of small farmers, who make up the majority in the agricultural sector, and their performance. These factors can be domestic or international; individual, social, institutional, or environmental. When the performance of the family sector is compromised in Mozambique, the performance of the entire agricultural sector is compromised. In addition, depending on whether long or short time series are analysed, conclusions may vary (see Figure 1). Take, for example, the developments in cassava productivity.

2.1 The performance of the agricultural sector

Agricultural production performance is measured as an approximation to the function of providing food safety, according to studies carried out by the Rural Environment Observatory (OMR) (Carrilho et al. 2016; Abbas 2017; Mosca and Nova 2019). The main data sources used by these authors are the official statistical yearbooks, based on agricultural surveys (Agricultural Survey Project—TIA; Integrated Agricultural Survey—IAI) (MASA 2012; MASA 2015; MASA 2016; INE 2017),⁴ and statistical data from the FAO, some of which are estimated.⁵ The statistics published by the Ministry of Agriculture and Food Safety (MASA) are also taken into account.⁶

Over the last 10 years, both the population and the number of poor people increased, although poverty declined in proportional terms (INE 2012: 30; INE 2019; UNDP 2018; Arndt et al. 2018: 314). While there was an increase in the number of farms, accompanying the population growth, the total cultivated area did not increase proportionally (MASA 2015: 22; MASA 2016: 22). Although rural migration does occur, the increase in the urban population is mainly explained by natural growth, as is also the case in other African countries (Hansine and Arnaldo 2019: 307). Regional imbalances continue: the Human Development Index (HDI) is lower in the provinces with a higher population, area and agricultural production (INE 2012).⁷ As to the quality of development, Mozambique has eight out of 13 indicators in the bottom third of countries (UNDP 2018: 8). The reduction in the absolute cultivated area is not necessarily a problem in itself. But what happened then?

⁴ In addition, several documents from the Central Statistics Office, INE, are also used <http://www.ine.gov.mz/> (accessed 24 October 2019).

⁵ <http://www.fao.org/faostat/en/#data/QC> (accessed 24 October 2019).

⁶ <http://www.agricultura.gov.mz/estatisticas/> (14 July 2020). The www.agricultura.gov.mz address belongs to the Ministry of Agriculture and Rural Development (MADER), which replaced MASA in February 2020. In June 2020, its website replaced the previous <http://www.masa.gov.mz>, which was accessed by the authors in October 2019 in order to prepare this study. Given that the previous address is now inactive, it is the new website that will be referred to throughout the text. Regarding the history of MADER and its predecessors, see Notes 15 and 17 below.

⁷ From an analysis of the attached INE Tables (2012) and the results of the 2017 Census (INE, 2019).

Food production and productivity

Per capita production of food declined, as did productivity per hectare of food crops; total livestock increased, but only for poultry meat, and there was an increase in per capita consumption.

Between 2010 and 2017, per capita production of some foodstuffs, such as cereals, fell to almost half. At national level, the yield per hectare of food crops also declined (see Table 1⁸). The reduction in productivity between 2012 and 2015, more pronounced in 2013, was most probably due to the floods, pests and lack of rain (MASA 2015: 38; MASA 2016: 46–48), in addition to the general socioeconomic context. Its slow recovery indicates a lack of resilience and the inability of the sector to resume previous trends.

Productivity improved in large and medium-sized farms and in the agricultural schemes with contracts signed between large and medium-sized processing and marketing companies and small farmers (Mucavel 2018: 6, 10). These schemes are believed to involve between 10 and 20 per cent of the around 4 million small farms. (MASA 2016: 41, 49). The average area per farm fell from 1.4 to 1.2 hectares (ha) between 2010 and 2015. (INE 2011; INE 2019).

As to total livestock, there was an increase in the total numbers of cattle and pigs and a decrease in the total numbers of sheep and goats. But, generally speaking, headage declined due to the increase in the population. As to poultry, the total number of ducks declined while the total number of hens remained stable. However, there was an increase in mechanical separation and, consequently, the availability of poultry meat per capita went from 1.88 kg in 2010 to 3.31 kg in 2017 (see Table 2).

Sustainability, forest cover, and climate change

The low levels of adoption of sustainable technologies correspond to an increase in deforestation. The highest proportion of deforestation comes as a result of unsustainable farming practices and the expansion of human settlements.

The low levels of adoption of sustainable technologies correspond to an increase in deforestation, at an annual rate of forest loss of 0.79 per cent (MITADER 2018: 27). The highest proportion of deforestation, 65 per cent, comes as a result of unsustainable farming practices, such as subsistence slash-and-burn farming, and the expansion of human settlements (12 per cent). An estimated 2.8 million hectares is expected to be lost by 2035 if current trends continue unchecked (Afonso 2019: 11).

Climate change is still having an impact on agricultural performance. In 24 of the last 43 years, from 1976 to 2019, extreme and moderate climate events were recorded, including cyclones, storms and tropical depressions, floods and droughts or lack of rain (MICOA 2007: 23; U. Mandamule 2019: 2). It cannot be categorically stated that there is an increase in the frequency of these events, but reference is made to the risks of an increase in the damage caused, apparently as a result of higher population density in the regions more at risk of being affected.

⁸The table includes data on crops generally included in the Agricultural Statistics Yearbook, including roots and tubers. Note that the priority crops in the African Union (AU) are rice, corn, sorghum, millet, vegetables, cassava, cotton, palm oil, beef, dairy products, poultry and fish (AU/NEPAD 2017: 24).

As to environmental sustainability, of the nine indicators, Mozambique has four in the top third of most sustainable countries, two in the middle third and three in the bottom third of countries (UNDP 2018: 10).⁹

2.2 The contribution of the agricultural sector to food safety and the national economy

Balance of trade in food processing and exports

There is a systematic and increasing deficit balance of trade in food processing.

According to MASA statistics on its website, food insecurity fell from 34.8 per cent in 2006 to 23.7 per cent in 2013 and, during the same period, acute malnutrition, resulting in low weight for height (wasting), stood at 4.5 and 7.2 per cent, respectively, for the same years. Chronic malnutrition, resulting in low weight for age (stunting), was 46.2 per cent in 2006, falling to 43.3 per cent in 2013. The last family budget survey, which measured malnutrition, was carried out in 2014/2015 and recorded a figure of 43.2 per cent for chronic malnutrition.

The main agricultural exports between 2001 and 2017 were tobacco, sugar, cotton, cashew, and sesame, representing around 88 per cent of total exports. Maize accounted for around 3 per cent of exports during this time. Abbas (2017: 23) showed that food production in Mozambique is not sufficient to feed the population. The balance of trade had a severe deficit between 2008 and 2016. The period between 2013 and 2014 saw the highest deficit of around 4.4 billion dollars. The current deficit is comparable to 2007 (Mosca and Nova 2019: 16).

Contribution of the agricultural sector to the GDP and its weight in investment in and credit to agriculture

The contribution of the agricultural sector to the GDP is decreasing, as is the weight of agriculture in investments.

The contribution of the agricultural sector to the GDP fell five percentage points between 2010 and 2017 (see Table 3¹⁰). The contribution of forestry may be underestimated: Afonso (2019: 2) estimates it at 4 per cent. Generally speaking, there has been a constant decrease, which Mosca and Nova (2019: 19) attribute to the production increase in other sectors, particularly natural resources and services.

Private investment in agriculture and agroindustry represented 21 per cent of the total between 2001 and 2017, with 61 per cent of this coming from loans, 32 per cent from direct foreign investment and 7 per cent from direct national investment, located mainly in Zambézia and Gaza provinces.

The proportion of credit to agriculture over total credit to the economy went from around 18 per cent in 2001 to around 3.5 per cent in 2017, 60 per cent of which was aimed at sugar, cotton, cashew, tea and copra, as well as at livestock and forestry.

⁹ The resilience to climate risks indicator, included in the Malabo Declaration Assessment Framework (AU/NEPAD 2017), which refers to the *proportion of arable land with sustainable management*, was not reported due to a lack of data.

¹⁰ <http://www.ine.gov.mz/estatisticas/estatisticas-economicas/contas-nacionais/anuais-1/pib-na-optica-de-producao/pib-na-optica-de-producao-2020/view> (accessed 14 July 2020).

3 Institutional factors

The data presented show that the performance was irregular and does not reflect the priority which the agricultural sector should, by law, have been given. Below, we mention some of the sectoral institutional factors that we believe are the most important in this context. As to the rules of the game, the examples generally refer to governance of the use of the land and the forests. We also take a supplementary look at the political and economic, social, legal, and state construction environment, which we believe are in themselves a factor with an impact on the agricultural sector.

3.1 Institutional instability and state (in)capacity

The agricultural sector is understood as the set of sectoral public institutions and other non-public institutions, including written and unwritten rules on their activities and interactions (established formally or informally, consultancy platforms, cooperation and working with and among the business society, civil society and the farmers).

We have mentioned that the increase in the agricultural area—without an increase in the cultivated area—came about through deforestation without the use of environmentally-friendly technologies; we have mentioned pests and diseases as causes of pre- and post-harvest losses; we have mentioned the balance of trade deficit.

The question we want to look at is if the changes in organization and the rules of the game have resolved the constraints to productivity and sustainability, particularly in family farming. If the institutional changes have compromised the ability to provide basic services, then these changes have not had a positive impact on the increase in productivity and, thus, the performance of the agricultural sector, mainly taking the increase in the population to be fed into account.

With the aim of relating capacity, governance, and sectoral performance, we analysed the capacity and governance guided by the following criteria for insertion¹¹ and dialogue.¹² We also occasionally compared sectoral performance with the goals of the Malabo Declaration.^{13, 14} An analysis of the capacity for structuring or vertical links at various levels, without losing the already acquired capacities of providing services to the farmers, is outside of the scope of this study.

Insertion and organization of the public institutions in the agricultural sector

The organizations and rules of the game in the agricultural sector have been unstable in recent decades.

¹¹ The capacity to understand, frame, respect and influence the ‘general rules of the game’ of governance and of society.

¹² The capacity to understand, frame, respect and influence the ‘sectoral rules of the game’, i.e. governance capacity, with dialogue and horizontal links, inter-sectoral and multiple public, private and civil partners, through the implementation and monitoring of the implementation of policies in the agricultural sector.

¹³ <https://www.nepad.org/caadp/publication/malabo-declaration-accelerated-agricultural-growth> (accessed 14 July 2020).

¹⁴ The Comprehensive Africa Agriculture Development Programme (CAADP) seems to be the policy framework with the best chance of being kept stable for a long period. The programme includes seven pillars and 43 indicators (GdM and NEPAD 2017: 1; MASA 2017: 7).

The basic services for plant and animal health, agricultural research and extension, statistics, supervision and quality control, protection and development of genetic material, enforcing the law and resolving market distortions have lost their priority in relation to localized and occasional private interests.

By their very nature, public institutions are the ones with most geographic coverage and that can follow more standardized and widely-known relationship rules. Private organizations and the relationships between them are more limited and variable according to the agents, actions and places involved. Therefore, we will first look at the public institutions to provide parameters to assess the relationship between institutional development and performance in the agricultural sector.

The Ministry of Agriculture and Rural Development (MADER) is currently¹⁵ the main public institution responsible for the agricultural sector. It has inherited many of the changes that have taken place. Until recently, the Ministry of Land and Rural Development (MITADER) co-existed with MASA. Both are represented at provincial level, but representation at district level is not uniform, nor is there a direct subordination relationship in the framework of the decentralization process. The institutional development of the agricultural sector reflects the complex transformation of the reality—of practices, structuring of land occupancy, infrastructures and relationships with the authority and the market—arising from agricultural and ecological characteristics, economic, geographic and political history, including wars of occupation, aggression and a civil war, particularly in the last quarter of the twentieth century.¹⁶

The duties of agricultural marketing, land and forest administration, and the promotion of rural development were regularly transferred between ministries.¹⁷ A similar process took place in the areas of domestic and foreign trade, industry, and tourism.¹⁸

¹⁵ The new Ministry of Agriculture and Rural Development (MADER) was set up in 2020. The Ministry of Land and the Environment (MITA) was also set up at this time. This study began in 2019 when the Ministry of Agriculture and Food Safety (MASA), which will be referred to frequently, still existed.

¹⁶ As a historical note, the Department of Agriculture, structured in Agriculture, Forestry and Livestock sections, set up within the Department of Public Works in 1908, reached 1968 as a group of institutions that gave rise to the first Ministry of Agriculture. See <http://www.agricultura.gov.mz/institucional/ministerio/historial/> (accessed 14 July—see Note 6), as well as Robert Moncure (USDA 1968: 28), who says that '[...] Mozambique has a highly complex system of organizations dealing with agriculture: A Secretaria Provincial de Terras e Povoamento (Provincial Secretary of Land and People) [...]; O Servicos de Agricultura e Florestas (Agriculture and Forest Service) [...]; Instituto de Investigacao Agronomica (Institute of Agronomic Research) [...]; O Servico de Veterinaria (Veterinary Service) [...]; Instituto de Algodao (Cotton Institute) [...]; Instituto de Cerais (Cereals Institute) [...]; Missao de Inquerito Agricola (Mission of Agricultural Inquiry)[...].'

¹⁷ The different earlier 'versions' of the ministry responsible for the agricultural sector were successively created by Decree No. 1/1975, of 27 July, Presidential Decree No. 2/1994, of 21 December; Presidential Decree No. 1/2000, of 17 January; Presidential Decree No. 13/2005, of 4 February; Presidential Decree No. 1/2015, of 16 January. The duty of supervision of agricultural marketing was transferred to the Ministry of Internal Trade in 1978 and, in 1981, AGRICOM EE (state agricultural trade company) was set up. In 1994, this gave way to the newly created Institute of Cereals of Mozambique (ICM) and the Agricultural Marketing Fund (MIC, 2013: 12). In 1994, the Ministry of Agriculture and Fisheries (MAP) was also set up. In 2000, MAP gave way to the newly created Ministry of Agriculture and Rural Development (MADER), which also absorbed the Rural Development Institute (INDER). The Ministry of Agriculture (MINAG) returned in 2005 and was followed by the Ministry of Agriculture and Food Safety (MASA) in 2015. The Ministry of Land, the Environment and Rural Development (MITADER), set up at the same time as MASA, took over responsibility from the Ministry of Agriculture for the management of Land and Geomatics, Forests and Wild Fauna and Rural Development, this last being reintegrated into MADER, set up again in 2020.

¹⁸ <https://www.mic.gov.mz/por/pocas/HISTORIAL-DO-MIC> (accessed 24 October 2019). The Ministry of Industry and Trade became the Ministry of Industry and Energy and the Ministries of Domestic Trade and Foreign

The ten-year period between 1995 and 2005 was fertile in the approval of policies, strategies and structuring laws, particularly in the area of natural resources, both renewable and non-renewable, including the Land, Forests and Wild Fauna, Land Use Planning, the Environment, Conservation, Mines and Oil acts (Chiziane 2015: 29), some with provisions conflicting with the rules of the game. From 2005 to 2013, several plans and strategies for sectoral development were formulated, bringing about changes in focus and priority, such as the Rural Development Strategy (EDR), the Green Revolution Strategy, the Strategic Development Plan for the Agricultural Sector (PEDSA) (MINAG 2011) and the National Investment Plan for the Agricultural Sector (PNISA) (MINAG 2013a; MASA 2018), the Support Plan for Intensification and Diversification of Agriculture and Livestock (IDAP), the Action Plan for Food Production (PAPA), the Agricultural Marketing Strategy, the Integrated Agricultural Marketing Plan (PICA), described as an instrument for the implementation of PEDSA, the Master Plan for the Development of Agribusiness (PDDA), and many others (Mosca 2011: 239–269; Granheim 2013: 47). There was also deconcentration and decentralization of powers and responsibilities, particularly at provincial, municipal and district levels, from 2004, with the approval of the regulations¹⁹ for the Local Government Act (LOLE)²⁰ and other legal documents (Mosca and Bruna, 2016: 23–31).

Along with the name changes, there were also changes in the ‘rules of the game’. Responsibilities were transferred, particularly in the areas of land, marketing, light industry and food, irrigation and promotion. The changes cascaded down to the lower levels, with the set-up, closure and transformation of commissions or national boards, state secretariats and autonomous funds.

With all these organizational efforts, it would only be natural to expect stellar performance in the capacity to negotiate a suitable annual budget, a minimum of 10 per cent of the state budget (OE) for the sector and the ability to control macroeconomic impacts on the sector to ensure the agreed annual growth goal of 6 per cent. The Mozambican state would have been expected to take on its typical duties, as well as to have the capacity for planning and negotiating with other agents in the agricultural sector, at least on the five priority value chains in the Comprehensive Africa Agriculture Development Programme (CAADP). But underbudgeting, poor use of the budget and the lack of a clear, long-term vision for institutional capacitation brought the combined result of a weak state apparatus in the sector. Its weakness led to enforced outsourcing of programmes and projects to NGOs and companies and agribusinesses whose participations were usually short in duration and with very limited geographic scope, carrying out contract agriculture schemes. In addition, the efforts made to support farmers' organizations so that they could have more bargaining capacity for negotiating prices and the terms and conditions of their production contracts were negligible.²¹ Let us look at what happened in relation to the goals of the Malabo Declaration.

The state budget allocation to the agricultural sector during the same period was, on average, 4 per cent, going up to 6 per cent in 2019, but still lower than the African Union commitment of 10 per

Trade in 1983, the Ministry of Trade in 1986, the Ministry of Industry, Trade and Tourism in 1995, and, again, the Ministry of Industry and Trade in 2000, with readjustments every five years.

¹⁹ Decree No. 11/2005, of 10 June.

²⁰ Law No. 8/2003, of 19 May.

²¹ One example of the effects of this dependence can be found in the weak development of a seed industry promoting more competition and less dependence of the farmer on the promoter. The authors believe that the poor development of the national seed industry is mainly due to the (i) non-existence of a specific policy to promote the integrated development of the seed chain; (ii) poor technical and financial ability in public research and the non-existence of private research to develop productive varieties adapted to the different types of agriculture (mainly family farms); and (iii) the still very low demand on the certified seed market, given that the agricultural sector consists mainly of subsistence farming, unable to access improved seeds.

cent (Nova et al. 2019: 6). GdM and NEPAD (2017) confirm non-compliance with this goal but calculate a budget allocation of between 6 and 7 per cent to the agricultural sector, given that they used different classification criteria. Apart from the allocation being below the goal, the same authors (2017: 8–9) show that the investment aimed at institutional support and production support has been declining since 2012. However, these developments are not uniform; for example, investment in rural extension increased, although it is still not sufficient to maintain the extensionist/farmer ratio.

Generally speaking, funding has been insufficient to assure internal organization capacity and the capacity of staff to provide the most important state services, such as agricultural statistics, which should be open to the farmers, research, extension, information and communication, monitoring plant health and animal health, supervision and the enforcement of protection and production incentives. The distribution of people depends on the resources available at provincial and district level. Nova et al. (2019) indicate that Zambézia, Nampula and Tete provinces, where 53 per cent of the country's cultivated land is farmed, receive an allocation corresponding to 31 per cent of the operating budget. As to the public investment budget, this is distributed equally, with around 24 per cent for production support, 24 per cent for extension and research and 24 per cent for institutional support. The remaining 28 per cent is earmarked for forestry, livestock, irrigation and land administration services (2019: 8).

The assessment report on the developments in the implementation of these goals (GdM and NEPAD 2017: 30) states that 71 per cent²² was reached on the index for generation and use of statistical data and information on the agricultural sector, while recognising the need for improving information gathering in order to monitor progress. The biennial assessment report on the implementation of the aforementioned Malabo Declaration goals (MASA 2017) assesses the level of CAADP progress in the country at 57 per cent.²³ While noting some improvements, the report mentions that it is still far from reaching the goals of eradicating hunger and reducing poverty (2017: 32–34).

In relation to production assistance, the total number of extensionists was 2,025 in 2013 and 2,794 in 2018, including the public extension network—which increased from 1,137 to 1,863—the network of companies—which went from 281 to 510—and the NGO network, which fell from 607 to 421 extensionists. The extension service currently provides assistance to around 20 per cent of farms in an irregular fashion and with few visits per farmer, for a goal of 100 per cent in 2018, according to the Malabo goals.

At macroeconomic level, inflation, the exchange rate and bank interest rates have an impact on growth in the agricultural sector, through stimulating consumption and investment (Abbas 2015: 23). With the exception of 2016 and 2017, inflation remained stable, at single digits; following a steep increase in 2016, the exchange rate stabilized at around 62 MZN/USD; and interest rates fell from the peak in 2017 (around 24 per cent), while still remaining high (around 20 per cent).²⁴ However, by extending the analysis period to the last 15 years, a trend towards devaluation of the metical emerges, as well as a trend towards increasing bank interest rates and a decrease in the

²² For a goal of 63 per cent.

²³ Several indicators in the Biennial Report (MASA 2017) have not been calculated or their calculations are open to question. See, for example, the absence of data on post-harvest losses.

²⁴ Source: <https://pt.tradingeconomics.com/mozambique/indicators> (accessed 27 October 2019).

proportion of credit to agriculture. The annual average growth rate in the sector in the two-year period 2015–16 was 2.7 per cent, in comparison to the goal of 6 per cent between 2015 and 2025.

One of the frequent root changes in sectoral institutions, their structures and the rules of the game is the lack of consensus on how to deal with the agriculture issue and other possible causes mentioned, which come into focus at election time.

An overall assessment of the developments in the structuring and regulation of the sector since independence indicates that rapid modernization is a consensual aim.

In effect, two sides have been competing:

- (i) One defends accelerated modernization based on the industrialization of agriculture and buying technology, with little attention paid to the transformation of the small farmer into a commercial farmer. The choice of this option is based on being aware of the experiences and lessons learnt in other countries and an incomplete reading of the history and the context. It is based on the belief that small family farmers do not really respond to economic stimuli, they are incapable of modernising without the intervention of the state and that intervention should be through projects and programmes where the pivotal element is the small, medium-sized or large company, whether agricultural, agro-industrial, state, cooperative or private. It is systematically highlighted that medium-sized and large farms have higher yields than small farms (Mucavel 2018: 6, 10), in order to highlight the importance of prioritising the former to the detriment of the latter. This is mechanical modernization.
- (ii) The other argues that the modernization of agriculture comes as a result of the modernization of the entire society, that it is not exclusively sectoral and it is dependent on the political, social and economic context of the country and the rules of the game. It is not enough to buy technology, no matter how successful this may have been in other contexts. It is based on evidence that small farmers are capable of modernising, by participating in the development and adoption of the most appropriate technology for each place and time, to the point of increasing their participation outside the agricultural sector, provided they have access to the resources and rights needed for this. This is humanized modernization.

The first side has been gaining the upper hand over the last decade. We noted that there are, in fact, programmes and projects with positive impacts, localized geographically and according to the group involved, in terms of increasing productivity. But observation of the national indicators shows that these interventions and all the changes in policies and institutional channels providing service to the public do not seem to have influenced the development of family farming, the general increase in their productivity, the generalized adoption of environmentally friendly technologies or the increase in total volumes of food production.²⁵ Pending a more in-depth analysis of turning points, an inspection of the data indicates two points of change in the development of food crop production around 1994 and 2008, the first attributable to the end of the climate of violence. As to the second, it is possible that it was as a result of nationwide institutional changes, but we have found no relationship with the development of the sectoral institutions.

²⁵ According to (GdM and NEPAD 2017: 14), the value added growth rate is estimated at, on average, 2.14 per cent (with MASA believing that this indicator was at risk of non-compliance at the time). There are also indications that the land productivity growth rate is increasing and may allow the goals to be met, considering the increase in the use of fertilisers to be an important step in this direction. No mention is made of quality seeds.

To improve the performance of an agri-food system that has indeed been shown to be polycentric, by choice of the state, which even chose to delegate duties that would normally remain in its hands, it is vital that ‘state-centric’ measures do not continue to be prioritized. They may bring some transitory, localized results to the volatile partnership negotiations, as may be convenient, with the common denominator of protecting private interests. But it is unrealistic to expect these to stop prioritising profit and to replace the state in the relationship, which will for now have to be a long-term one, providing essential agricultural and conflict resolution services and services in the interest of the small farmers. If there is no systematic and sustained construction of the state, the same will be true for the results.

Up to now, however, the frequent changes and institutional discontinuity in the public sector and the dependence on agents and players who are likewise uncertain for family farmers have caused instability for food producers, which we attribute, at least in part, to the irregular performance²⁶ of the sector.

Dialogue: the rules of the game for land and forestry governance and the relationship with the private sector

Generally speaking, the laws and rules of the game are in favour of agriculture, but compliance with these is not assured.

We are referring to the fact that the ten-year period between 1995 and 2005 was rife with approvals of structuring policies, strategies, and laws. The legislative framework, as well as the majority of the customary regulations, whose application is enshrined in the Constitution, would then bring tranquillity to the farmers. Notable examples are the Land Act, frequently cited as one of the best in Africa (Tanner 2010: 105), and the Forest and Wildlife Act.

But we will see below that access to justice is unequal due to the level of structuring, regulation and access to the judicial system and the still disproportionately higher power of the government and large private interests to influence the decisions of the courts, making this too a source of uncertainty that ends up influencing performance in the sector.

The majority of land rights are not registered, but this is not required by law and non-registration does not prejudice this right. Currently, around 24 million hectares (DINAT 2018), or 30 per cent of the land area is registered, of which 12.3 million hectares, up to March 2019, was registered to rural communities (Topsøe-Jensen et al. 2019: 59)

In Mozambique, there are no agricultural or land courts or tribunals or sessions. The jurisdiction for issues related to the agricultural sector lies with common judicial and administrative courts.²⁷ It is important to know:

- a) which courts these are and how they relate to each other;
- b) which government institutions are involved in registration, licensing, supervision, inspection and law enforcement;
- c) what their role is in known cases, and, from there,
- d) to assess the independence of the judicial courts.

²⁶ A MASA (2017: 28) assessment shows that performance was good in 43 of the CAADP indicators, satisfactory in 15 indicators and unsatisfactory in six. If this were the only source, we would say that the performance was satisfactory. But our framework is based on the primary function of agriculture being to produce food and to supply other products to other sectors.

²⁷ See articles 223 and 228 and following of the Constitution of the Republic (2004).

The community courts provided for in the country's Constitution would be those that could deal with more agricultural cases. They can be found in several districts, but they lack regulation,²⁸ which is extended to their powers, as they are positioned between the formal and the informal and are linked with alternative ways and means of conflict resolution (Alfazema 2015: 8), and facilitating the legal pluralism recognized by the Constitution.²⁹

Cases that have been through the local courts of mediation are normally sent to higher administrative bodies before being presented to the courts. This fact gives government bodies at various levels disproportionate power to resolve the cases that bring them into conflict with citizens in their own favour.

Exceptionally, when the conditions are in place, these cases can be taken to higher judicial courts. In some cases, when they have the support of the Mozambican Bar Association (OAM), they may get convictions, even against the government or elite economic agents. For example, this was how convictions were obtained against VALE Moçambique and the Mozambican state, through its government,³⁰ in the case of the resettling process in Tete, as well as the conviction of the ProSAVANA Office, for engaging in secretiveness and lack of transparency regarding the plans for acquisition and use of land rights (OAM 2018).

Other cases, even with the support of the OAM, are faced with difficulties in being heard. An example of this is the case of the land irregularly attributed in Afungi, Palma District, to the Rovuma Basin gas project, resulting in an illegal right to use and benefit from the land (*direito de uso e aproveitamento da terra*: DUAT), definitively issued two years after the legal opinion of its illegality was pronounced (Trindade et al. 2015). The OAM, agreeing with the legal opinion, appealed against the DUAT nullity declaration. One year later, the Administrative Court refused to hear the case, alleging that the communities had accepted it and could be adversely affected (OAM 2019) by an interruption of the activities. This example raises questions as to the independence of the courts.

The majority of land conflicts are resolved by non-judicial bodies, through mediation and seeking reconciliation, promoted by the district authorities or by the Provincial Services of Geography and Cadastre (SPGC). When private companies and investors are involved, the resolution is more favourable to the communities when they are assisted by civil society organizations (U.A. Mandamule 2016: 24).

Some areas in the agricultural sector are regularly inspected (Topsøe-Jensen et al. 2019: 72, list land use inspection instruments). The ministries responsible for the sector also have inspectors that deal with complaints from the public. In this way, officials who abuse their power may be penalized. A conflict management department was set up in land administration in 2015. In Forest and Wildlife administration, the law provides for a strategy for the participation of community inspectors, which was actually developed (Bila 2005). An inspection operation of national scope was implemented for monitoring timber harvesting ('operation trunk') and, occasionally, there has been news of combating poaching and trade in hunting trophies. The supervision of land use

²⁸ <http://opais.sapo.mz/muchanga-defende-regulamentacao-de-tribunais-comunitarios>, 22 July 2019 (accessed 27 October 2019).

²⁹ Article 4 of the Constitution of the Republic (2004).

³⁰ Through Decision No. 09/TAPT/19 of the Tete Administrative Court (O País 2019).

activities has resulted in the withdrawal of DUAT or rescaling of idle land. However, law enforcement powers are weak, partly due to the conflicts between legal commands (Capaina 2019), the capture of the state by private interests and the insufficiency of human and financial resources, resulting in inefficient use of resources.

Thus, although the legislative framework is formally favourable, some of the subsectors where the ‘capture of the state’ is more frequent are precisely forestry plantations (Bruna 2017), livestock and game farms and using and benefiting from the land, areas of elite interests with easy access to capital, who obtained land rights in areas they use only a very small proportion of and in conflict with the local population (JA and UNAC 2011: 58–59), and timber harvesting, where intensive logging is carried out (Afonso 2019: 9).

Dialogue: the rules of the game for land and forestry governance and the relationship with civil society

There is a voice and there is participation, sometimes effective, very often fruitless.

Community and public participation are generally considered in the practices and the legislation in Mozambique (OSISA 2009: 74 and following) and this observation extends to the agricultural sector. Apart from the public hearings mechanism, where people can participate individually, there are also other types of participation through organizations.

The right of association is governed by Law No. 8/91, of 18 July. The process of revising this law, in order to simplify it, with participation by civil society organizations, is not making any progress.

There are civil society organizations and consultation forums—councils, association forums—at various levels, from community level to central level.³¹ Some have a wide membership base.³² Others include product-oriented companies and/or institutions.³³ Some of these institutions have local representation, taking part in consultations, work, and local assessment of policies (Topsøe-Jensen et al. 2015: 54 and following).

Some forms of participation are simply informational, opening up room for clarifications, others are for specific consultation on a topic or programmes, while others are for dialogue and working together, with operational results. Some operate independently, others are organized around topics or causes. Freedom of speech in the country favours the participation and accountability of the state and other formal organizations, as well as public assessment of their performance and the rules of the game that apply. But public agricultural institutions have shown themselves to be little inclined to adopting accountability mechanisms open to their sector partners. For example, information on rights to use and benefit from the land is not available to the public.

On the positive side, community consultations in the DUAT application process could result in a record or document, such as a licence or certificate, with forensic value, and others, as in the case

³¹ For example, Law No. 19/97, of 1 October (on Land), Law No. 34/2014, of 31 December (on the Right to Information, the draft Agriculture Act and the revision of Law No. 8/91, of 18 July (on Associations) had direct interaction from the parliament.

³² The National Farmers’ Union (UNAC), which came into being in 1987, is an example of a farmers’ movement with provincial representation and support from the Farmers’ Associations governed by Decree-Law No. 2/2006, of 3 May, on Farmers’ Associations.

³³ Such as the Mozambican Association of Sugar Producers (APAMO), the National Forum for Cotton Producers (FONPA), the National Forum for Pulse Vegetables, the Mozambican Poultry Producers Association (AMA) the Mozambican Poultry Industry Association (AMIA), etc.

of the Consultation Forum on Land or Forests, where any consensus is not binding, but is difficult to ignore, provided it does not imply revision of the legislation. And there are others, which do not include representation of the state or the government, and their positions and actions are aimed more at supervision and advocacy, as is the case of the Budget Monitoring Forum (FMO), the Land Forum in Nampula and the Women's Forum. Some of them were formally constituted and are the object of a legal instrument.³⁴

Local organizations are being invited to take part in the formulation of policies, as well as the monitoring of their implementation. The favoured participation channels are the Community Councils, which can have specific names—for example, the Participatory Management Councils (COGEP) for land resources, forests, and fauna. However, in the agricultural sector, this has not been a systematic practice common to all the public institutions. There are cases where there was effective participation by civil society organizations (CSO) but, in the majority of cases, either there was no involvement or there were only poorly prepared soundings that had no effect.

The complex network of organizations participating in the agricultural sector allows for attendance and participation at different levels and at different occasions for complaint, consultation, advocacy, supervision, etc. The examples presented in the previous section show that their voice is not always heard (Salomão et al. 2019a: 7) and they do not always fully represent the communities (Salomão et al. 2019b: 6). In spite of this, their participation is of intrinsic value in the transfer of information and knowledge of the general positions of the players involved. This value is also present in events at regional and national representation levels. It is from these consultations that alliances and agendas are structured and more effective actions are initiated.

We assume that the coordination between their agents has some impact on the performance of the agricultural sector (MINAG 2013b: 2). In the biennial report assessing the implementation of the goals of the Malabo Declaration, the involvement and quality of the multisector coordinating body and the different development partners stand at 40.6 per cent (MASA 2017: 8).

Cooperation between the public sector and civil society is formally considered necessary and the frequency of some forums is established by decree. However, occasions for cooperation are systematically postponed.³⁵

In short, consultations and participation, as well as the mechanisms established for this purpose, are present in the daily routine of the agricultural sector. However, the efficiency of such participation is not reliable, generating uncertainty among the farmers as to whether all the parties involved will keep up their side of the agreements. The 'social contract' is still not binding. It would be an opportunity to develop an alliance between the state, the producers, especially the small farmers, their organizations, and other institutions to improve the performance in the sector. In Mozambique, when institutions are organized and work to ensure good performance in the family sector, the conditions become more favourable for improving the performance of the entire agricultural sector in its tasks of producing food and other agricultural products to support the development of the country.

³⁴ For example, the Land Consultation Forum was set up by Decree No. 42/2010, of 20 October. The Tourism Forum was set up by Decree No. 25/2017, of 23 June.

³⁵ As an example, the last (9th) session of the Land Consultation Forum, which is supposed to be held twice a year, was held on 8 and 9 November 2017.

Summary

Returning to the question we proposed looking at, we assessed if the changes in organization and the rules of the game had resolved the constraints to productivity and sustainability, particularly in family farming.

We believe there were sufficient indicators to show that the institutional changes compromised the ability to plan, structure, consolidate and hold dialogues, from central to local level, in order to assure the provision of basic services which, as we have seen, would eliminate constraints, particularly in terms of:

- ensuring safe access to land, water and knowledge resources;
- ensuring access to basic supplies, such as seeds, fertilisers and protection products against pests and diseases;
- reducing pre- and post-harvest losses;
- promoting the predictability of the yields and integration into local, regional, national and global markets;
- promoting soil fertility, even with some intensification.

We found no clear signs that climate events have had an impact on the long-term trend in the performance of the sector. The political, economic, and social climates appear to have had more of an impact. In fact, pending a more detailed analysis of the trends and points of change, two growth periods were found, although this growth does not correspond to the increase in the total population. The first, during the 10 years between 1994 and 2004, we attributed to the recovery of agriculture after 30 years of armed conflict. The second, shorter, between 2009 and 2012 (see Figure 2), may have been due to the aggressive promotion of improving the business environment between 2008 and 2010,³⁶ not specifically about, but also including, the agricultural sector.

3.2 The political, economic, and social context

Political instability, violence, and the legitimacy of the state

Periods of stability interspersed with periods of instability and violence, with a negative impact on agriculture.

In this section, a brief assessment is proposed of the impact of armed violence on the agricultural sector, based on studies and news about the conflict, its root causes and consequences and the implications for the sustainability of the sector, using the privileged access which, as a civil society organization, the OMR has had to conferences, seminars, research projects and rural environment encounters. The sources are open access.

We will see that the periods of stability were interspersed with periods of instability and violence with a negative impact on agriculture, causing people to abandon their areas of residence and production, generating pressure and situations of disputes over rights of use of resources and interrupting the provision of services to small farmers, delegated to medium-sized and large companies.

³⁶ See <https://tradingeconomics.com/mozambique/ease-of-doing-business> (accessed 24 October 2019).

Vast tracts of Mozambique experienced a situation of constant political and military instability for around 30 years. Peace was partially and temporarily restored for two decades, from 1992 to 2011, but political and military tensions returned cyclically to threaten peace and tranquillity.

The armed conflicts in Mozambique and the intermittent armed conflicts in recent years (2012–19)³⁷ involved and affected, due to their nature and location, rural communities and crop and livestock farmers, and also affected the sectors they are linked to (Brück 1998: 1047–48). The main theatres were the provinces in the centre and north of the country, which are also the ones with the largest farming population, working the largest cultivated area, growing both food crops and cash crops. The main investments in land and natural resources are also in these regions, with impacts on the farming rights and conditions of the rural society. In addition, conflicts in the centre of the country brought with them the risk of cuts in terrestrial communications between north and south, and the coast and the hinterland.

Armed violence severed sales channels, worsened the already weak capacity for providing agricultural services and affected activities related to jobs outside of farming and consumption of farm produce, including tourism. In 2014, the National Farmers' Union (UNAC) estimated that around 69,000 farming families had been affected by the war (UNAC 2014: 2). Political violence and the conflicts had an impact on the people's movements and on women (ASFC et al. 2019: 44–48), the main segment of the rural population, as well as on the environment. In March 2016, it was estimated that over 11,000 Mozambicans had moved to Malawi (Sampaio 2016). However, these figures do not reflect the scale of migration over relatively short distances.

The possibility that the armed conflict may have aggravated the effects of the climate variations, which, as can be seen in Table 1, caused reductions in cereal and cassava production in 2013, cannot be ignored. It has been assumed that the recourse to the sale of forest products, as well as wild food and medicinal products, is a regular strategy undertaken by rural families in the event of any reduction in production. This assumption has been the subject of further studies. The migration caused by the armed violence disconnected the communities from their known environment, limiting their access to these natural products.

The first attacks by groups assumed to have ethno-religious roots in the extreme northern coastal area in Mozambique occurred on 5 October 2017 (Maquenzi and Feijó 2019: 13). This situation of political, military, and social violence has been deteriorating in recent years, with an impact on the stability of the farming population and on food safety (Jornal Notícias 2018; TVM – Redacção 2020).

As can be seen, a) faced with the existence of diverse armed groups, the state has no effective monopoly on the use of force; b) local administrative structures were weakened; c) the rural population, mostly farmers, were seriously affected by the war; and d) the harshest hit regions are also the ones with the highest agriculture and livestock production potential, having also been affected by extreme climate events during the most recent episodes of armed violence.

Building the legitimacy of the state is a continuous process, but certainly involves the consensus of recognition in terms of the representation of wills, its role in assuring the safety of people and property, the protection of social rights, the structuring and provision of other public services and the promotion of development. In some cases, the inability to assure the provision of agricultural public services and promote the development of a broad base in the sector, focusing too on

³⁷ Some of the many documents giving the timeline and a description of the armed conflicts in Mozambique include those by Borges-Coelho (2010), Lucas (2016) and Correia da Silva (2014).

reducing inequalities, may have contributed to the erosion of the legitimacy of the state, facilitating the outbreak of violence with an impact on agricultural production.

In short, some parts of the country that are extremely important to the agricultural sector have been living in an uneasy situation for decades, which affects agricultural production and productivity. The popular response to safety, which led to ample recovery of the agricultural sector after the Treaty of Rome³⁸ in 1992, was not repeated in the agreements of the last decade. Population growth and its territorial distribution has generated hotbeds of conflict over scarce resources.

Sovereignty and independence

Sovereignty and independence make sense when there is a possibility of and ability to formulate and implement policies to create a certain vision of development in the sector. But the lack of economic and financial independence greatly constrains independence in economic policy decision-making. As stated by Mosca (2011: 452), agricultural policies and strategies were imported and were based on the assumption of external funding. One possible way of ‘defending’ sovereign rights in the event of weakness is participation in regional and international organizations, programmes and agreements, along with other countries in similar conditions, such as CAADP and the commitments undertaken through the Declaration of Maputo³⁹ in 2003 and of Malabo in 2014.

In our opinion, external interventions have not always been negative, sometimes indicating alternatives for the transfer of knowledge and the stabilization of the conditions under which farmers make their decisions as economic and social agents. In addition, they do not excuse the lack of ability to formulate and implement policies, whether on the part of the state or on the part of civil organizations.

4 Looking to the future

In this section, it was decided to present some reflections on ‘institutional’ issues that could contribute to the debate on the future of the agricultural sector. This reflection is based on four assumptions, the first three of which we believe to be vital in order to be able to envision the development of Agriculture in Mozambique: (1) peace will be consolidated and effective all over the country; (2) governance will make the elimination of poverty and the reduction of social inequalities a priority; (3) the agricultural sector will be considered to be a priority for reducing poverty, achieving social stability, consolidating peace and promoting socioeconomic, endogenous, inclusive and sustained development; (4) even if there are sweeping changes in the prevailing institutional framework (especially with regard to economic and social public policies), it will be difficult for the economy as a whole to create enough employment at a pace that could absorb and increase the working population.

We realize that it will be difficult for the first three conditions referred to above to become effective in the short term. In fact, the signs point to peace continuing to be threatened, as the security

³⁸ http://www.ipris.org/files/6/07_Documento_Acordo_Geral.pdf (accessed 14 July 2020).

³⁹ Declaration Assembly/AU/Decl.7, available at https://au.int/sites/default/files/decisions/9548-assembly_en_10_12_july_2003_auc_the_second_ordinary_session_0.pdf (accessed 14 July 2020).

situation is deteriorating again, due to the emergence of armed actions, even if they are confined to some areas in the centre of the country (conflict with armed RENAMO dissidents) and Cabo Delgado Province (emergence and expansion of radical groups apparently backed by the Islamic State). The government, in its recently approved five-year programme, gives priority to the elimination of poverty, the reduction in social inequalities and agricultural development. However, these were also priorities in the five-year programmes of previous governments, and evidence has shown that these were either not addressed or addressed half-heartedly.⁴⁰

4.1 What timeframe?

Since the beginning of this century, the development of the agricultural sector has been planned for periods of five years at the most. In our opinion, this period is too short, bearing in mind that Mozambican agriculture is characterized by low productivity and high vulnerability to climatic events and market instability and failures. An increase in agricultural productivity (essential for increasing market competitiveness) and a reduction in these vulnerabilities imply broad structural transformation, not only in the agricultural sector, but also in the secondary and tertiary sectors relevant to rural development. And these transformations require integrated policies with a long-term outlook (at least 10 years), as well as the ability and time to implement them effectively and efficiently.

When considering the future of the agricultural sector, there are four main issues to be taken into account for decision-making on development options:

(i) the development of the extractive industry and its impacts on the Mozambican economy and society

Huge investments are planned over the next 10 years in the gas extraction industry, in areas 1 and 4 of the Rovuma Basin in the North of Mozambique. The estimated total investment in the projects in these areas is USD 50.6 billion and the accumulated revenue for the Mozambican government in the first 25 years of exploration will be USD 95.9 billion. According to the Ministry of the Economy and Finance (MEF), the accumulated revenue generated for the government by these projects in the first 25 years may vary between USD 31.3 billion, the worst case scenario, and USD 71.5 billion, the best case scenario (MEF, 2018). In either case, bearing in mind the other investments underway and planned for the extractive industry (gas in Inhambane, coal, heavy minerals, precious stones, etc.), there will be an increasing inflow of large amounts of foreign currency, with the risk of causing sharp appreciation of the metical, which could have both positive and negative consequences for the Mozambican economy. For the agricultural sector, a stronger metical will, on the one hand, allow for reducing the cost of increasing production through intensification, given that the majority of production goods are imported. On the other hand, it will make domestic agricultural products more expensive and less competitive on national and international markets.

The broad expectation of different Mozambican political and civil society segments is that the revenue from the extractive industry will be channelled towards promoting more endogenous, diverse, inclusive and sustainable socioeconomic development, reducing dependence on the exploration of non-renewable resources. The present government has manifested the intention to adopt policies that will make these expectations a reality and official discourse continues to consider the agricultural sector to be a priority in this diverse and sustained development

⁴⁰ This evidence is referred to in sections 2.1 and 3.1 above.

perspective.⁴¹ A study is underway on the constitution of a Sovereign Fund,⁴² which could be an essential instrument for the application of these policies and for avoiding undesirable fluctuations in the metical. These policies and instruments could be determining factors for the development of the agricultural sector in the long term, provided they are actually implemented. This is why it is fundamental that the public, private and non-governmental institutions participating in the agricultural sector have the capacity to influence the formulation and adoption of these policies.

(ii) population growth and internal migration

The INE predicts that in 2040, Mozambique will have a total population of around 46.18 million (around 1.6 times more than the estimated total population in 2019), with 59.8 per cent living in rural areas and 40.2 per cent in urban centres (INE 2010). This means that the current population distribution of 67.1 per cent rural and 32.9 per cent urban in 2019, according to an estimate also by the INE, will change significantly due to the increased migration to urban centres. It is probable that there will be a greater trend towards migration to the urban centres by younger people, which will result in some ageing of the rural population and a reduction in relation to young people with some education working in agriculture. Under these conditions, the trend will be towards a reduction in the capacity of Mozambican agriculture to produce basic foodstuffs to meet the growing consumption needs nationwide, particularly in urban areas, and an increase in the production of commodities for export. This trend towards reduction requires structural transformations, not only in the agricultural sector, but also in other economic and social sectors with an impact on development in rural areas.

(iii) development of national and international markets for agricultural products

It is relevant to analyse the dynamics of current and future agricultural markets in the process of reflection on the future of agriculture. The demand for basic foodstuffs processed in the national market could double, not only due to overall and urban population growth, but also due to the increase in family incomes if more inclusive public policies promoting economic diversification are adopted. It will be important to pay attention to the pattern changes in domestic food consumption led by the availability of new products on the domestic market. Competition from imported food products will tend to increase on the domestic market, whether due to the increase in domestic demand or due to the reduction in domestic prices of imported products as a result of the appreciation of the metical, unless the Central Bank manages currency exchange in such a way as to avoid this phenomenon. There has been a huge increase in international transactions in agri-food products in the last 50 years—the value of international product flow increased fivefold (FAO 2018: 34)—and will very probably continue to increase exponentially with the increase in the world population and the improvement of the quality of life in densely populated countries like China and India. International markets for agri-food and other commodities will very probably continue to be dominated by the present leaders in these markets.⁴³ When planning the future of

⁴¹ According to the PES 2020 Proposal, submitted to parliament by the government (Council of Ministers 2020a), 10.2 per cent of the state budget for 2020, excluding General State Expenditure, is earmarked for the Agriculture and Rural Development sector. Nevertheless, according to Mosca (2020: 11–12), the allocation to all the institutions of the new Ministries of Agriculture and Rural Development (MITADER) and of the Land and the Environment (MTA) is just 6.3 per cent.

⁴² The process of designing the Sovereign Fund is slow and lacks transparency and public consultation. The Government's Five-Year Programme 2020-2024 (Council of Ministers 2020b) does not present any perspective on the constitution of this fund.

⁴³ According to FAO data for 2018, the biggest importers and exporters of agri-food products are: (1) Importers: China, USA, Germany, Netherlands, Japan, France, Italy, Belgium, Canada, Spain, India and Mexico; (2) Exporters:

the agricultural sector, there is a need for analysis of the changes and trends in the development of trade relations in these markets, increasingly determined by commodity exchanges and futures markets (Medeiros 2014).

(iv) climate change

Mozambique has always been periodically affected by droughts (especially in the South and Centre regions) and by floods (all over the country, with greater incidence in the Centre and North regions), as it is in an area at high risk of adverse climatic events. This risk is tending to increase due to the worsening of climate change worldwide. Proof of this can be seen in the prolonged period of drought in the southern region, the violence of the recent cyclones, Idai and Kenneth, and the abnormal rains in the centre and north of the country. Brito and Holman (2012: 38) estimate that climate change will negatively impact productivity between 2046 and 2065, with yield reductions of 11 per cent for maize, 6.4 per cent for soya, 4.6 per cent for peanuts, 4.2 per cent for cassava, 3.5 per cent for sorghum and 2.9 per cent for cotton. These impacts could be more severe in some regions. Therefore, it is fundamental for the country to define a specific, long-term strategy to develop a form of agriculture that is less vulnerable to climate change. This strategy will have to incorporate concrete measures for the development and dissemination of agricultural technologies that are environmentally friendly and resilient to climate change, as well as appropriate infrastructures for mitigating the risks brought by the negative impacts of climate change.

4.2 Some key institutional factors for the development of the agricultural sector

The analysis in Sections I and II shows that the performance of the agricultural sector has been poor over the last two decades and this was heavily influenced by institutional weaknesses, mainly concerning public policies, the capacity to apply the existing legislation, the quality of public services and the capacity of the productive sectors. However, there are other factors that wield, and will continue to wield, considerable influence on the agricultural sector, such as the behaviour of the goods and services market and the country's capacity to fund agricultural development.

The sustained and inclusive development of agriculture must be seen as a lengthy process, one that must be based on long-term, stable public policies that will ensure compatibility and connection between the sectoral policies and that will be effectively implemented by competent public institutions that are wholly committed to this process. To ensure that the policies are inclusive, adequate and effectively implemented, non-governmental and private social and economic organizations must play a structured role both in their design and in the monitoring of their implementation. To this end, these organizations need specific training to improve the quality of their intervention in the policies through dialogue and advocacy.

The increase in productivity and productive efficiency through more capital-intensive techniques that are not harmful to the environment must be a main, specific aim of any future agricultural policy, to ensure the competitiveness of Mozambican producers on domestic and foreign markets. Because agriculture is the basis for the livelihood and reproduction of the majority of rural families and because over 95 per cent of agricultural production is, and will very probably continue to be, carried out by small family farmers, they should be the target group for a policy that is both conducive to productivity and environmentally friendly. This policy should include measures to facilitate the integration of small farmers into value chains with high market potential and into

USA, Netherlands, Brazil, Germany, France, Spain, Canada, Italy, Australia and Indonesia. In other words, eight of these countries are both the largest importers and exporters of agri-food.

product, goods and services markets, promoting their capacity to negotiate this integration under conditions that bring benefits to their income and living conditions.

Decentralization and the improvement of the quality of agricultural public services are two conditions that are necessary for making this policy that is ‘conducive to productivity and environmentally friendly’ a reality. Decentralization brings the services closer to the farmers, helping them increase their ability to respond to demand. But, for decentralization to result in an increase in the quality of these services, they must be provided with greater human, material and financial capacity, giving priority to the key services for technological development and productivity (agricultural research and extension, control of pests and diseases, seed certification, soil laboratories) and to ensure good management and preservation of natural resources (land, water, flora, fauna), which chiefly implies capacity for planning and monitoring the use of these resources and local resolution of conflicts about access to them and between social and economic players. Decentralization of these key agricultural public services must take into account the fact that each one of them is an integrated institutional system which includes their own internal organization, their qualifications and technical and professional careers, their regulations and legal mandate for applying them and their strategies/plans for increasing their scope and quality. These systems need to be improved and adapted to improve the response quality of the services to the needs on the demand side, but it is fundamental for this process to avoid the tendency towards ad hoc, improvised restructuring, which has unfortunately been seen over the last two decades, with clear consequences on the fall in their quality, effectiveness and efficiency.⁴⁴

At the same time as the development of public services, it will also be necessary to stimulate diversification, expansion and an improvement in the quality of private services essential to production and productivity (supply of production goods, mechanization, agricultural marketing, savings and credit, transport, communications). As Mozambican agriculture consists mainly of non-intensive family farms aimed at subsistence, there is still little actual demand for these services. Therefore, it will be necessary to adopt policies and instruments which, on the one hand, stimulate actual demand for supplies and services by small farmers and, on the other, promote the expansion of geographic coverage (to facilitate access by the farmers) and the quality of the supply.

A future policy conducive to productivity must incorporate the development of productive infrastructures (to develop irrigated agriculture,⁴⁵ reduce post-harvest losses, and process and distribute products), as well as the expansion and improvement of the rural road, electricity, and communications networks.

Finally, one more question must be posed for reflection: will it be possible to promote the development of Mozambican agriculture in the next 10–20 years in an essentially liberal economic policy framework, or will specific economic policies be needed to stimulate this development? The authors believe that to propel endogenous agricultural development that is socially inclusive and sustained, Mozambique will need to adopt suitable credit policies to stimulate investment in the intensification of agricultural production, subsidies aimed at promoting an increase in productivity, price and market policies that reduce the risk of negative impacts in the production sector caused by fluctuations and market downturns, and customs regulations that do not expose national

⁴⁴ Evidence supporting this affirmation is presented in Section 3.1.

⁴⁵ According to the National Irrigation Programme 2017-2042 (INIR 2017: 7), 181,000 hectares of land have irrigation infrastructures, of which only 90,000 hectares are operational, and there is an estimated total area of 3 million hectares that is potentially irrigable.

farmers to very unequal competition from agricultural products whose export is promoted by their countries of origin through a variety of incentives.

4.3 A new factor placing constraints on the future: COVID-19

This paper was completed after the emergence of COVID-19, which rapidly became a pandemic affecting public health and the economy all over the world, with a greater incidence in the countries that dominate the world market. The strategy adopted by these countries was an also total lockdown in the circulation of people, public services, and economic activity, which is causing an accentuated contraction in their economies and turbulence in the financial markets, with extremely negative socioeconomic impacts worldwide.

Mozambique is still in the initial stages of this pandemic and there is a great deal of uncertainty as to what will happen in the coming months. But, irrespective of how the pandemic plays out, given Mozambique's high dependence on foreign investment and the export of commodities, whose prices are trending downwards, it is very likely that there will be a sharp downturn in the Mozambican economy, at least in the short term. This, and the continued interruption of foreign support to the state budget, will create serious difficulties for public finance, which is confronted with urgent needs to increase allocations to the health sector (to deal with the effects of the pandemic) and the defence sector (due to the intensification and expansion of the armed conflicts in the central provinces and in Cabo Delgado).

This negative spiral in the economy and finance will very probably penalize agricultural production activities through cuts in the budget allocation to agriculture and a reduction in the already poor availability of credit to the agricultural sector, which will cause disinvestment in the sector... From the perspective of agricultural development, the possible scenarios of the development of the pandemic, its economic and social consequences and the implications for the agricultural sector will have to be taken into account. This will be a complex exercise, but it is possible, and it is absolutely necessary.

5 Conclusion

A better performance in the agricultural sector requires institutional stability and a change in the modernization pattern.

With a growing population, mostly living in the countryside, but in a decreasing proportion, the need to increase agricultural production and productivity is widely recognized. The agricultural sector is probably the one with the highest number and frequency of changes in public institutions over recent decades. This instability comes to some extent from the lack of consensus as to the long-term vision for national and sector development. In another way, instability comes from the inability or, perhaps, the lack of commitment to really prioritising agriculture, but protecting itself from social criticism through media coverage and temporarily appeasing the rural population to maintain the image of a government that listens.

The lack of consensus as to how to deal with the agricultural issue and other possible causes mentioned, which come back into the limelight at election time, have resulted in frequent changes to the sector institutions, their structures and the rules of the game.

We have shown that the political, socioeconomic and cultural context and natural events have had an impact on the performance of the sector, positive or negative, but that the instability of the

organization and operation of the services that deal with constraints to production and productivity is prejudicial. Frequent, ineffective changes bring the risk of discrediting future institutional interventions and making them irrelevant.

Therefore, in relation to the future, we believe that what is needed is long-term, stable public policies that interlink sectors and are implemented effectively, with quality and major commitment from the public institutions, in order to ensure socially inclusive and sustained development. When formulating these policies, the demographic dynamics, the behaviour of domestic and international markets and climate change must be taken into account, with a watchful eye being kept on new factors, an example of which is the unexpected emergence of the COVID-19 pandemic.

We hope that we have also shown that the relative successes in cassava and poultry farming were possible due to persevering with modernization policies and factors supporting production and predictability.

We have pointed out that we believe a new, long-term modernization pattern is needed, based on the modernization of society and local development of human and technological resources. For the performance of the agricultural sector to stabilize and grow, what is needed is policies that both protect the national production sector and stimulate its productivity; and for this to become sustainable, there must be broad social support and it must be environmentally friendly and economically viable.

We have pointed to the importance of perseverance in this, in such a way that the attention paid to other promising sectors, such as mineral resources, is not at the expense of putting the agricultural sector into second place, and that it will continue being the one that most occupies, feeds and sustains the people of Mozambique for a long time to come.

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Tables and figures

Table 1: Food Production, 2010–2017

	Population	22,385,827	23,102,375	23,841,859	24,605,013	25,392,595	26,205,387	27,044,195	27,909,852
	Crop/Year	2010	2011	2012	2013	2014	2015	2016	2017
Cereal	Maize (T)	2,089,890	2,178,842	2,354,778	1,173,709	1,357,220	1,262,038	1,487,190	1,703,920
	Rice (T)	257,527	271,402	203,102	114,012	155,741	128,197	107,977	110,000
	Sorghum (T)	388,596	409,745	139,262	132,077	155,164	82,479	90,000	100,000
	Millet (T)	48,699	51,602	43,888	19,722	29,332	10,916	11,970	15,912
	Maize (ha)	1,738,042	1,812,717	1,572,000	1,722,500	1,703,500	1,570,526	1,627,783	1,830,368
	Rice (ha)	226,593	238,778	363,400	403,700	376,500	234,884	182,290	142,749
	Sorghum (ha)	638,165	639,000	307,300	369,800	295,300	197,420	200,000	210,000
	Millet (ha)	108,980	113,642	54,600	69,800	51,000	29,684	27,337	35,407
	Maize (T/ha)	1.20	1.20	1.50	0.68	0.80	0.80	0.91	0.93
	Rice (T/ha)	1.14	1.14	0.56	0.28	0.41	0.55	0.59	0.77
	Sorghum (T/ha)	0.61	0.64	0.45	0.36	0.53	0.42	0.45	0.48
	Millet (T/ha)	0.45	0.45	0.80	0.28	0.58	0.37	0.44	0.45
	<i>Total (T)</i>	<i>2,784,712</i>	<i>2,911,591</i>	<i>2,741,030</i>	<i>1,439,520</i>	<i>1,697,457</i>	<i>1,483,630</i>	<i>1,697,137</i>	<i>1,929,832</i>
Cereal	Kg/cap.	124.40	126.03	114.97	58.51	66.85	56.62	62.75	69.15
Vegetables	Beans (T)	226,190	228,358	273,584	293,749	284,015	269,814	278,335	292,251
	Peanuts (T)	157,685	95,700	112,913	121,405	140,124	92,729	85,000	90,000
	Beans (ha)	698,336	659,218	789,798	1,009,200	833,300	778,678	790,000	800,000
	Peanuts (ha)	365,856	288,000	389,300	404,700	416,500	382,303	390,000	400,000
	Beans (T/ha)	0.32	0.35	0.35	0.29	0.34	0.35	0.35	0.37
	Peanuts (T/ha)	0.43	0.33	0.29	0.30	0.34	0.24	0.22	0.23
	<i>Total (T)</i>	<i>383,875</i>	<i>324,058</i>	<i>386,497</i>	<i>415,154</i>	<i>424,139</i>	<i>362,543</i>	<i>363,335</i>	<i>382,251</i>
Vegetables	kg/cap.	17.15	14.03	16.21	16.87	16.70	13.83	13.43	13.70
Roots and Tubers	Cassava (T)	9,738,066	10,093,619	8,197,994	4,303,000	8,272,530	8,103,000	9,100,000	8,773,712
	Sweet potato (T)	873,788	915,509	1,173,404	1,468,575	502,611	390,407	644,336	700,000
	Cassava (ha)	1,254,294	1,293,568	762,600	933,100	870,300	1,016,034	1,165,363	1,070,377
	Sweet potato (ha)	79,751	77,884	71,300	70,000	71,500	44,769	52,345	65,594
	Cassava (T/ha)	7.76	7.80	10.75	4.61	9.51	7.98	7.81	8.20
	Sweet potato (T/ha)	10.96	11.75	16.46	20.98	7.03	8.72	12.31	10.67
	<i>Total (T)</i>	<i>10,611,854</i>	<i>11,009,128</i>	<i>9,371,398</i>	<i>5,771,575</i>	<i>8,775,141</i>	<i>8,493,407</i>	<i>9,744,336</i>	<i>9,473,712</i>
Roots and Tubers	Kg/cap.	474.04	476.54	393.06	234.57	345.58	324.11	360.31	339.44

Source: authors' elaboration based on data from FAOSTAT, MASA (2015), MASA (2016), INE (2019); FAOSTAT, available at <http://www.fao.org/faostat/en/#data/QC> (accessed 24 October 2019).

Table 2: Total livestock, headage and meat production

		2010	2011	2012	2013	2014	2015	2016	2017
	Population	22,385,827	23,102,375	23,841,859	24,605,013	25,392,595	26,205,387	27,044,195	27,909,852
Livestock (total)	Cattle	1,277,044	1,395,433	1,541,000	1,680,000	1,798,000	1,682,017	1,657,766	1,754,144
	Pigs	1,340,712	1,500,000	1,727,000	1,410,000	1,872,000	1,588,325	1,634,178	1,686,166
	Goats	3,907,483	4,000,000	4,448,000	4,548,000	4,783,000	3,256,487	3,500,000	3,944,665
	Sheep	220,391	220,000	234,000	247,000	218,000	136,872	133,353	135,000
	<i>Total total / 100 people</i>	<i>6,745,630</i> 30	<i>7,115,433</i> 31	<i>7,950,000</i> 33	<i>7,885,000</i> 32	<i>8,671,000</i> 34	<i>6,663,701</i> 25	<i>6,925,297</i> 26	<i>7,519,975</i> 27
Livestock ⁴⁶ (animals in production)	Cattle	81,030	99,260	118,520	107,720	119,200	123,030	154,760	141,732
	Pigs	1,620,000	1,800,000	2,030,000	2,160,000	2,293,583	1,951,640	1,892,093	2,000,000
	Goats	1,600,000	1,640,000	1,800,000	1,850,000	1,946,975	2,000,000	2,100,000	2,200,000
	Sheep	80,000	82,000	83,000	84,000	75,904	72,000	71,000	70,121
Livestock (meat production, Tonnes)	Cattle	8,103	9,926	11,852	10,772	11,920	12,303	15,476	15,444
	Pigs	97,200	108,000	121,800	129,600	150,056	120,557	123,715	124,000
	Goats	19,200	19,680	21,600	22,200	23,364	24,000	25,200	26,400
	Sheep	960	984	996	1,008	911	864	852	841
	<i>Total (Tonnes) kg/cap.</i>	<i>125,463</i> 6	<i>138,590</i> 6	<i>156,248</i> 7	<i>163,580</i> 7	<i>186,251</i> 7	<i>157,724</i> 6	<i>165,243</i> 6	<i>166,685</i> 6
Poultry (total)	Hens	23,922,000	22,000,000	18,985,000	21,958,000	22,469,000	14,361,000	15,200,000	17,741,000
	Ducks	1,882,000	1,800,000	1,800,000	1,750,000	2,855,000	2,497,000	2,486,000	2,554,000
	<i>Total total / 100 people</i>	<i>25,804,000</i> 115	<i>23,800,000</i> 103	<i>20,785,000</i> 87	<i>23,708,000</i> 96	<i>25,324,000</i> 100	<i>16,858,000</i> 64	<i>17,686,000</i> 65	<i>20,295,000</i> 73
Poultry (mechanical separation)	Hens	33,000,000	30,800,000	26,000,000	27,000,000	29,528,000	25,054,000	25,256,000	29,651,000
	Ducks	1,882,000	2,100,000	2,000,000	2,000,000	3,139,000	2,718,000	2,738,000	2,835,000
Poultry (meat production, Tonnes)	Hens	39,736	40,505	52,679	55,633	63,631	75,161	75,769	88,952
	Ducks	2,258	2,520	2,400	2,400	3,766	3,262	3,285	3,402
	<i>Total (Tonnes) kg/cap.</i>	<i>41,994</i> 1.88	<i>43,025</i> 1.86	<i>55,079</i> 2.31	<i>58,033</i> 2.36	<i>67,397</i> 2.65	<i>78,423</i> 2.99	<i>79,054</i> 2.92	<i>92,354</i> 3.31

Source: authors' elaboration based on data from FAOSTAT, MASA (2015), MASA (2016), INE (2019); FAOSTAT, available at <http://www.fao.org/faostat/en/#data/QC> (accessed 24 October 2019).

⁴⁶ FAOSTAT data. The Agricultural Statistics Yearbook for 2015 by MASA (Tables 98 and 99) estimates the number of pigs slaughtered at 300,000 and the number of goats slaughtered at 440,000. This discrepancy is more significant due to the weight of these figures on total production and headage. An analysis of the data and metadata raises the possibility of the number of pigs in production having been seriously overestimated, by a factor of 6.6: the FAO data include smoked and salted meats, which are not very common in Mozambique.

Table 3: Changes in the contribution of the agricultural sector to the GDP, 2008–2017 (in per cent)

Areas of Activity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Agriculture, Animal Production, Hunting and Forestry	26.8	26.6	25.9	25.1	23.7	22.5	21.8	21.0	20.8	20.9
Agriculture	22.7	22.7	22.1	21.4	20.1	19.1	18.4	17.7	17.5	17.6
Animal Production	1.9	1.8	1.8	1.8	1.8	1.6	1.6	1.7	1.6	1.7
Forestry	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.7

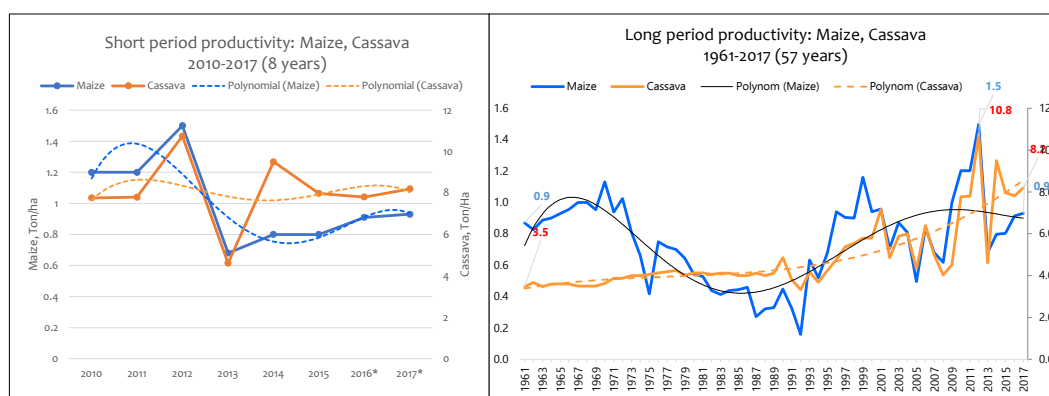
Source: authors' elaboration based on data from INE.⁴⁷

Figure 1: Short- and long-term productivity developments

Overview

Productivity

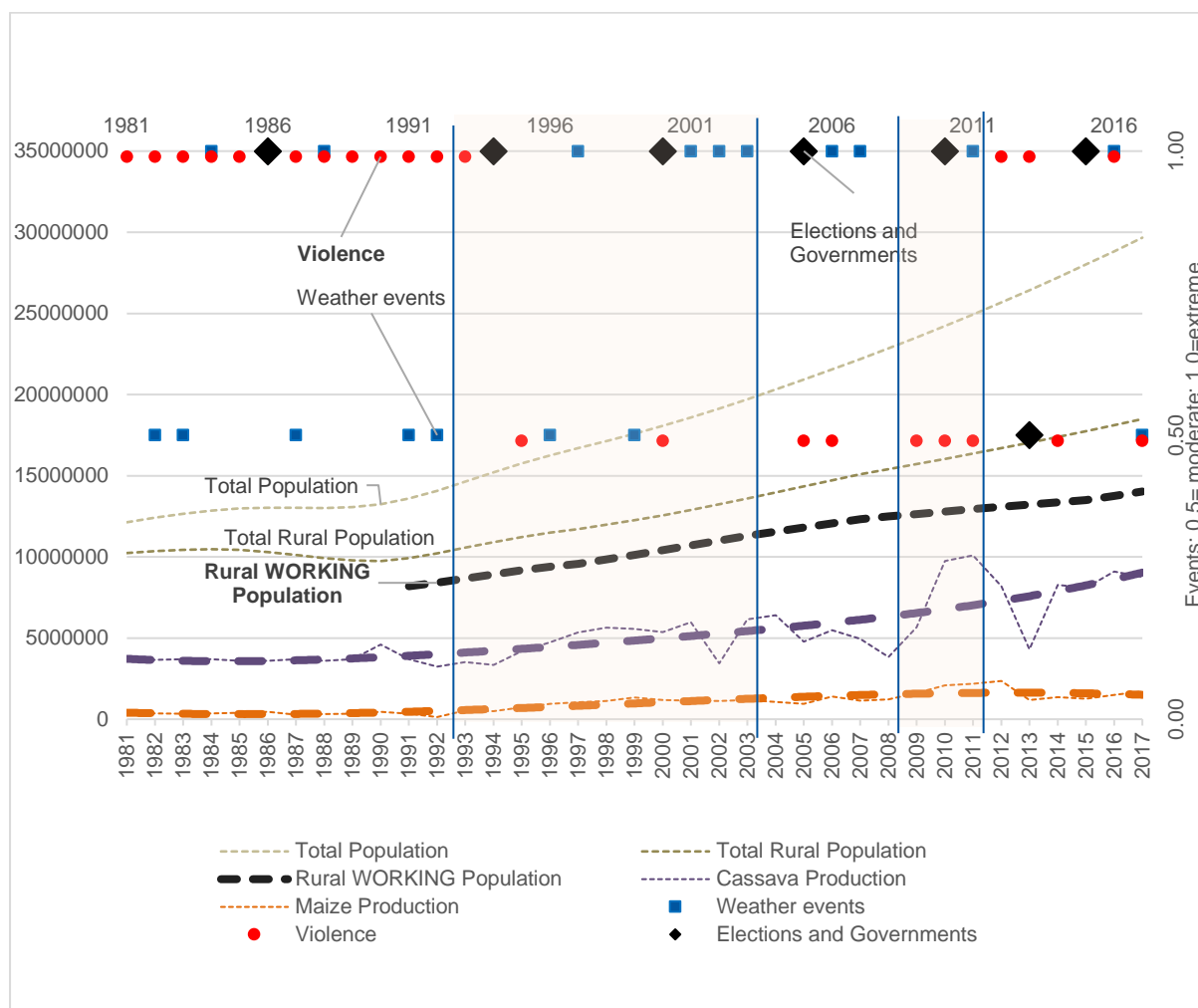
- Short period (8 years): decrease (Maize); slight increase (Cassava)
- Long period (57 years): periodical change; unaltered extremes (Maize); increase (Cassava)



Source: authors' elaboration based on elements from Mosca e Nova (2019), with FAO data.

⁴⁷ <http://www.ine.gov.mz/estatisticas/estatisticas-economicas/contas-nacionais/anuais-1/pib-na-optica-de-producao/pib-na-optica-de-producao-2020/view>—Table 6 (accessed 14 July 2020).

Figure 2: Maize and cassava production, population and weather events, violence and elections/governments



Note: (i) extreme weather events and violence are shown to have influenced the production of maize and cassava. (ii) The relationship between production and elections and government formation seems weak. (iii) The active rural population of producers increased less than the total population of consumers.

Source: authors' elaboration based on data from INE/WB and FAO for Population and Production, MICOA (2007) and Mandamule (2019) for Weather Events, and Correia da Silva (2014) and the authors' observations for Political and Military Events.